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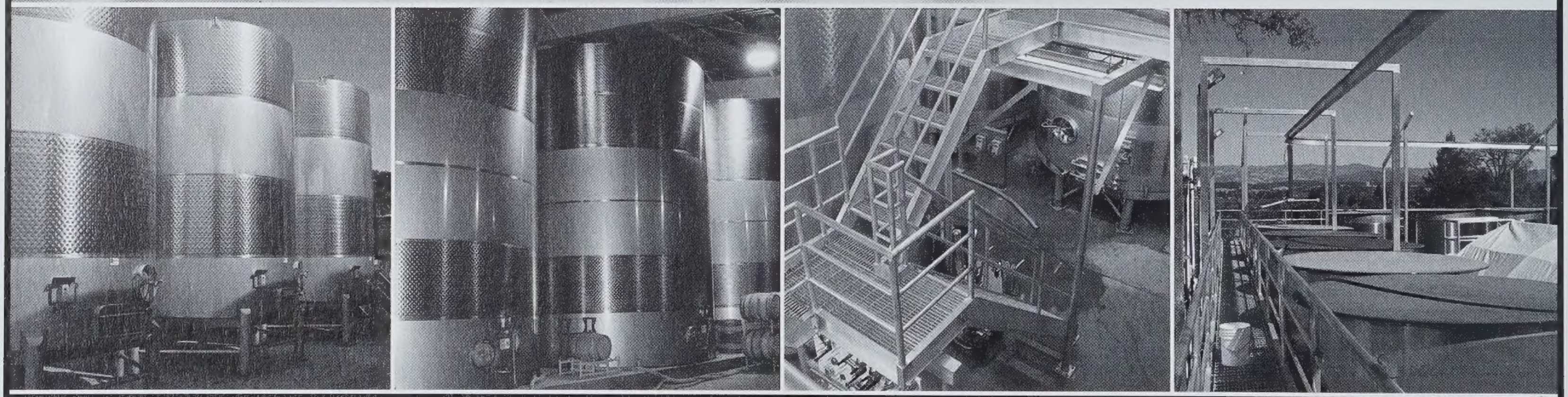

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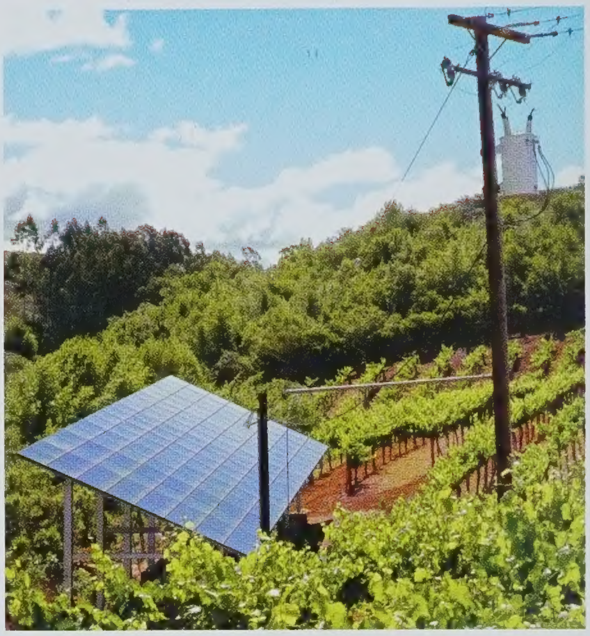

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Cover photo: Solar panels installed at Oakville Ranch Vineyards. (Photo by Don Neel)

"To stimulate continuing improvement in the wine industry."

VINEYARD IRRIGATION

WATER delivered by the SUN

BY **Tina Vierra**

Galileo once said, "Wine is sunlight, held together by water." There couldn't be a more apt description for the increasing use of solar arrays to power irrigation systems in California vineyards.

Efficiency first

David Henry (Harmony Farm Supply, Sebastopol, CA), with the help of Warren Brown Construction (Graton, CA), has installed solar power systems for several vineyard clients. With vineyard managers increasingly focused on sustainable practices, taking the irrigation system power to solar energy is a sensible and ultimately cost-effective goal. But Henry cautions the smart vineyard manager to pay attention to the status and efficiency of the irrigation system before taking an expensive step.

"The goal," says Henry, "is that every vine receives the right amount of water for optimum growth and production, while using the smallest amount of water. Then, the irrigation system uses 100% renewable energy as the energy source."

Henry stresses key farming techniques. Know your soils — texture, and type, and how they hold water. Know your soil moisture; promote water retention, and groundwater recharge. Cultivate healthy soil humus levels using mulch, compost, and green manure. Use cover crops to retain moisture and nutrient levels.

Learn how to measure and conserve irrigation water. Gross water applied X system efficiency = net water applied, according to the National Center for Appropriate Technology (NCAT) guidelines. NCAT's free "Guide to Efficient Irrigation" is a useful, plastic-coated, pocket-sized book for vineyard managers, covering efficiency tips in both water use and equipment maintenance (www.ncat.org / agri-publi.html).

Look at pump system efficiency. Henry advises that new AC motors and pump heads are more efficient — AC versions of positive displacement, low volume DC pumps use 50% less power. It could be cost-efficient in the long run to replace an AC pump even if it is not worn out. Well-designed pump stations also reduce water losses.

See Sidebar for a full-season efficiency checklist for your irrigation system.

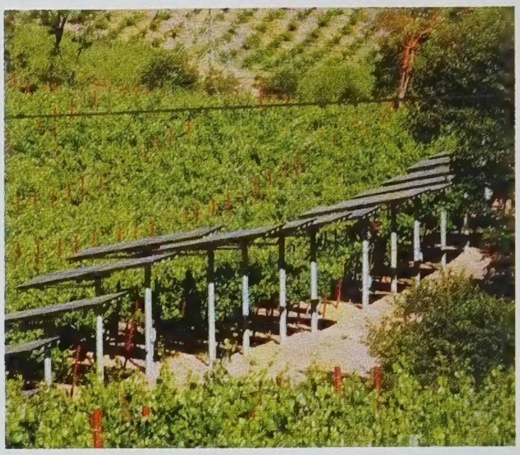
When you are ready to install a solar array to power irrigation pumps, your next decision is whether the array should be "grid-tied" or "off-grid." Grid-tied solar arrays are wired to send the energy they generate (DC current) to an inverter (AC current), and send it

Robert Keenan Winery's Chardonnay vineyard is now lined with 29 south-facing, pole-mounted solar arrays.

to the utility company's power grid. The vineyard's electricity meter runs backward until the irrigation pump operation pulls energy back from the utility's power grid.

When an irrigation system has standard AC pumps and controls, grid-tied solar arrays are the best option. Grid-tied is also the best option for large pumps because of the unlimited availability of power from the grid, should it be needed.

If the solar array is installed off-grid, photovoltaic (PV) cells can send DC current directly to DC pumps and controls. PV-generated energy can also be stored to batteries for later use. With an off-grid solar irrigation system, water is pumped during daylight hours, because that is when power is generated.



Keenan solar arrays are over nine feet tall to allow tractor turnaround, mounted so that shadows are cast on the turnaround space and not the vines.

"Off-grid solar works for all DC pumps, and for smaller AC pumps," says Henry. For the AC pumps, Henry installs a 4,000-watt inverter for every 1 horsepower (hp) of pumping. A battery is required for the start-up surge of the pump.

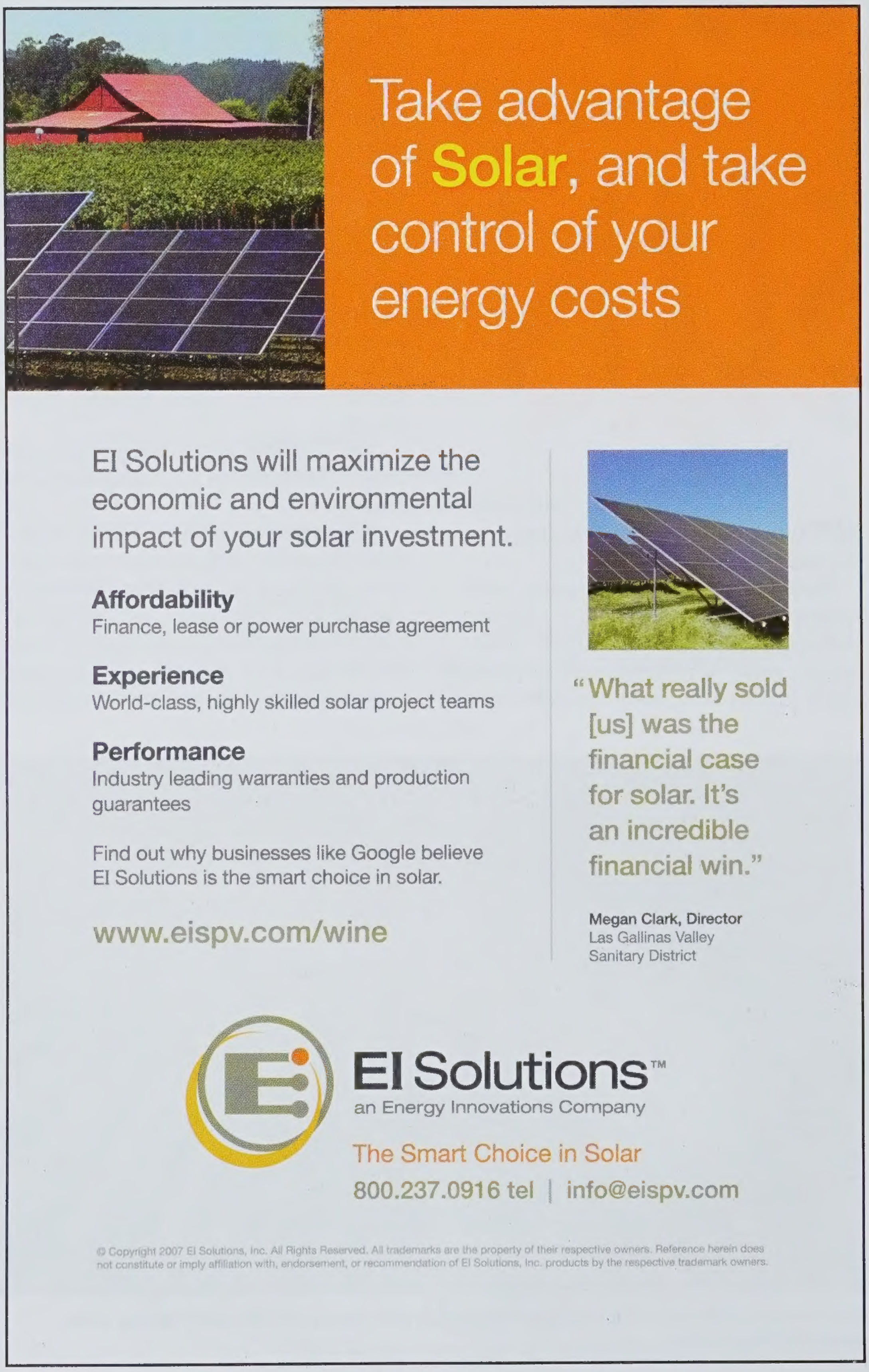
PRESTON VINEYARDS, Healdsburg, CA

Lou Preston has spent several years moving his vineyards to certified organic farming, and his winery to all sustainable practices.

Preston's irrigation system is powered by two rack-mounted field arrays totaling 18kW, running a 30hp water pump, installed in 2005 by Warren Brown using David Henry's design and hardware. Preston utilizes the grid-tied system, and has adjusted irrigation for maximum efficiency.

"Our utility rates are lowest (off-peak) between 6 PM and 6 AM, so that is our preferred irrigation time," he reports. "The next best time is 6 AM to noon (part-peak), and we would pay the highest utility rates from noon to 6 PM. It's better to water vines at night, and we earn the most for our energy generation in the noon to 6 PM window when our panels are generating the most energy."

Preston's water use has decreased as his soils have improved under



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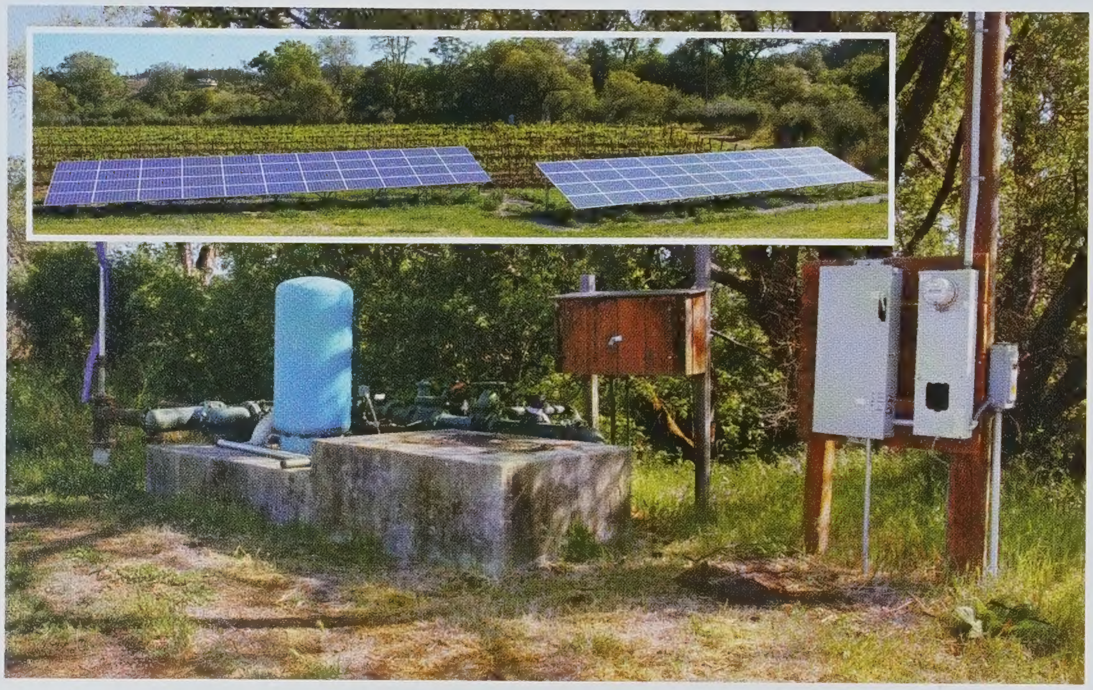

Two field arrays totaling 15kW (inset) power a 30hp water pump at Preston Vineyards.

organic practices. "Typical irrigation would be drip-irrigating 10 to 15 acres of vines at a time, plus some habitat areas on our property. We average 1,000 gallons/hour/acre, 200 to 300 gpm for eight hours."

The irrigation system is controlled by a programmable electronic timer for each block. The pump and water system are constantly pressurized, giving water on-demand when a block's master valve is opened.

With Northern California's bone-dry summers, Preston and his neighbors are under County Fire Marshall mandates to keep water available at all times. Preston's guideline is 500 gpm under pressure, from a hydrant, ready for firefighting needs, and the irrigation system is larger than his actual irrigation demands.

"We have the capacity to frost-protect at least 25 acres with sprinklers, if we wanted, using 1,200 gpm, but we chose not to make that investment," Preston adds.

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Medlock Ames is a sustainable and organic grape grower inspired by biodynamic methods. The 2,000-case winery produces primarily Merlot and Cabernet Sauvignon from the Alexander Valley appellation, and was built with energy efficiency in mind, including gravity-flow production and an underground cellar.

The winery had some early energy problems caused simply by being a country property with old, dilapidated service lines from Pacific Gas & Electric (PG&E). James and Morrison waited 18 months at winery start-up for 480-volt electrical service to be hooked up. Power poles and transformers on the property are very old and are slowly being replaced. The winery experienced brown-outs and shortages in its early days.

In February 2006, Warren Brown installed an 84 kW grid-tied solar system consisting of several panel arrays at various locations on the property. 18 kW powers a residence, with the rest of the system powering winery needs and vineyard irrigation.

The 25 kW "goose pond" array is the largest array, powering a 15hp pump that delivers water to the irrigation system, and some to water tanks on a hilltop, requiring more energy to pump uphill to the tank storage.

The 20 kW "Cabernet pond" array is located near a 5hp pump that is pulling from the utility grid to water about 20 acres, so this array isn't supplying all the energy needed for the 20 acres watered by the pump, but other arrays on the property make up the difference. The Cabernet pond pump only runs in summer at the height of irrigation needs, about five months each year.

"We divide the Cabernet block into several smaller sub-blocks that are irrigated separately, as needed, using the 5hp pump," says Kenneth Rochford, the winery's general manager. "Because of our varied topography, the pumps have varied maximum flow-rates. On our lower blocks, we can irrigate upwards of 200 gal/minute, while we can barely reach 20 gal/minute on our hilltops." Total water use is about 75 gallons per vine per year.

The 10kW "back-up" array powers a pump for a vineyard block on the west side of the property, in addition to sending excess energy to the PG&E grid for use elsewhere at Medlock Ames.

Chad Griffith (Harmony Farm Supply), designed the Medlock Ames PV system, and continues to advise on improvements to the 10-year-old irrigation system, such as pumping continuous flow at regulated pressure throughout the system.

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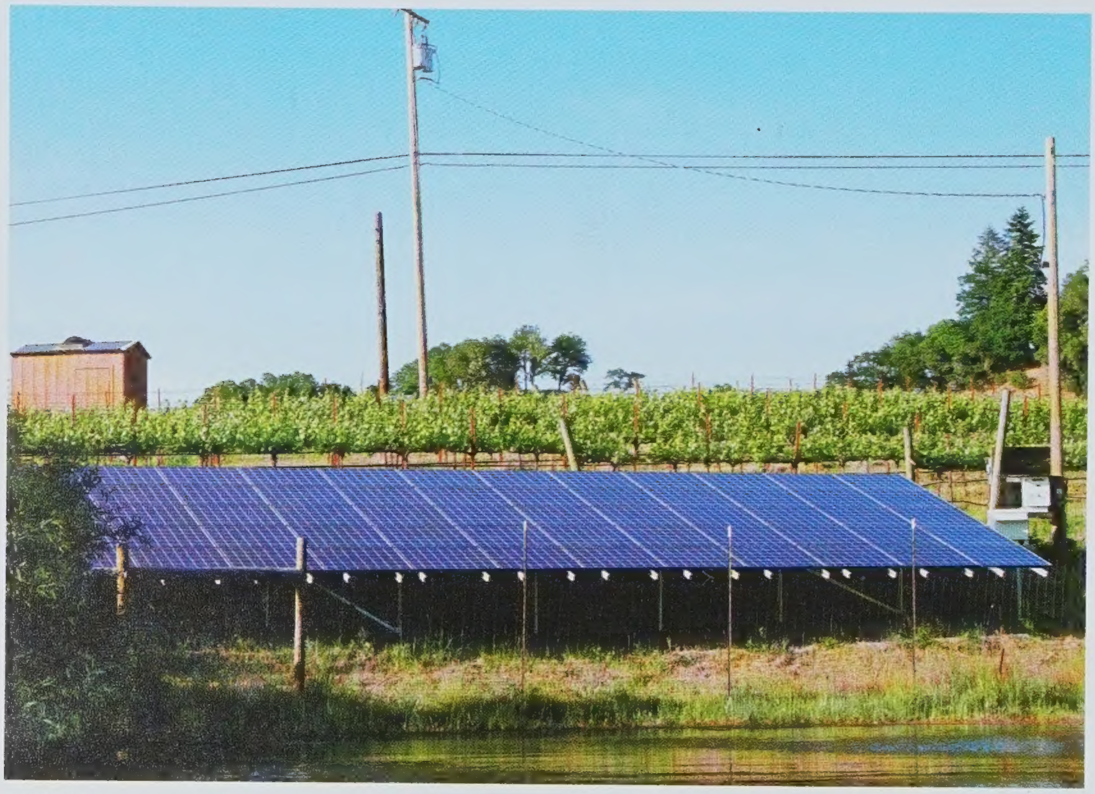
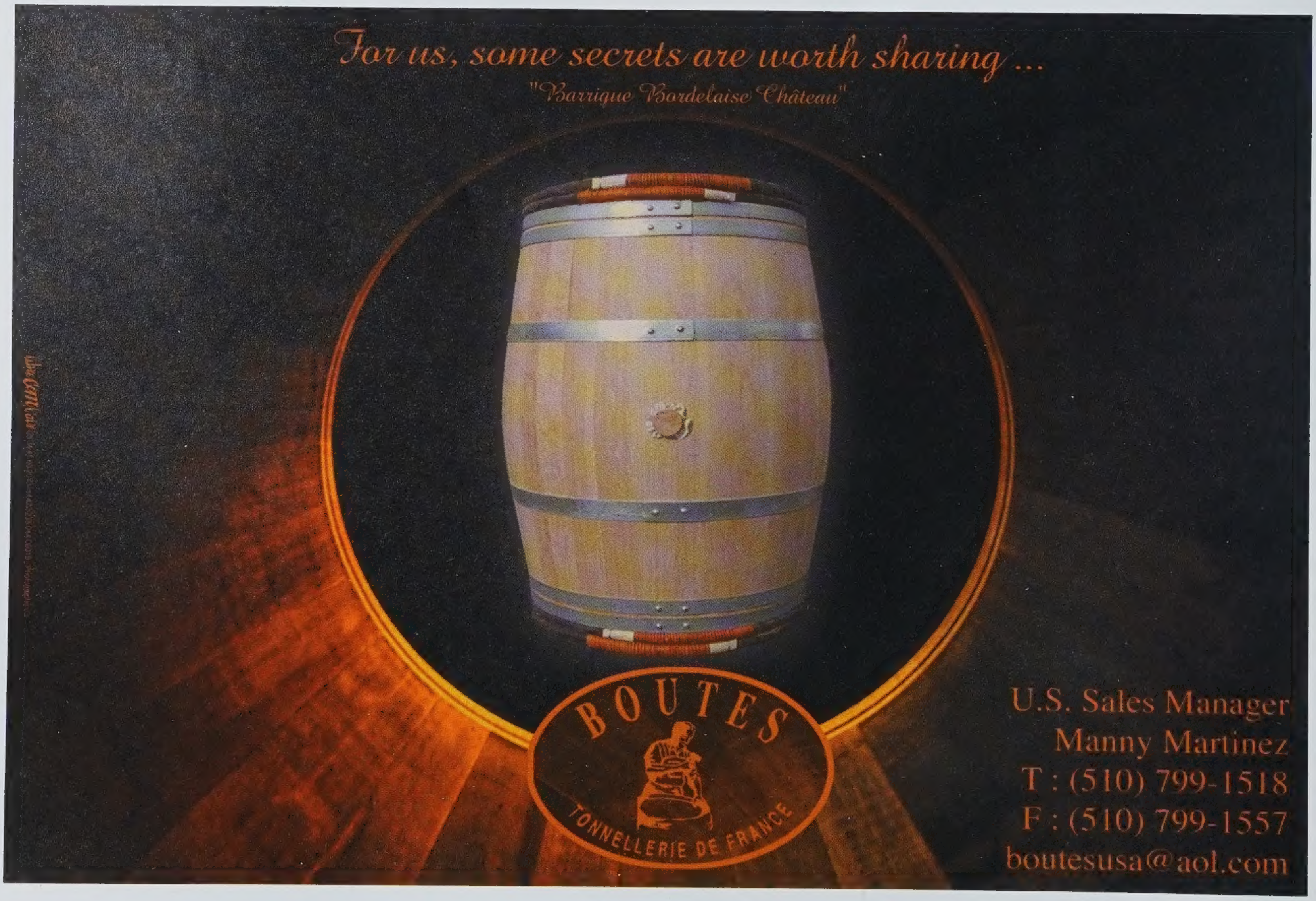


25 kW "goose pond" array at Medlock Ames powers a pump to deliver water to hilltop water tanks for irrigation.

Rochford agrees. "We have tried to maximize our irrigation efficiency in several ways: We plant our vineyard blocks on soils that have sufficient water holding capacity. We choose rootstocks that have low irrigation requirements.

"Drip irrigation has dramatically less evaporative loss than flood or sprinkler irrigation. We further limit evaporative loss by scheduling irrigation at night whenever possible. This has the added benefit of using energy when there is less peak demand, which minimizes impact on the grid. We carefully monitor the water status of our soils and vines throughout the growing season, and are very careful in only applying the minimum amount of water necessary.

"Low water use limits vine growth and allows vines to direct energy toward ripening the fruit rather than growing more leaves. This practice saves water on its own, but later in the



season there are fewer leaves to transpire water, which further reduces irrigation demand.”

Rochford concludes, “Medlock Ames advises fellow growers or wineries installing solar to follow practices such as those outlined here — find ways to make the existing system as efficient as possible, buy the smallest solar system for your needs, and choose vendors who are helpful in finding the rebates and tax incentives available to farms installing renewable energy.”

Lange Twins Wine Estate, Acampo, CA

Just north of Lodi, CA, Randall and Brad Lange (the “Lange Twins”) and their family farm 6,500 acres, and have been in operation for 30 years, selling grapes to wineries including Robert Mondavi and E&J Gallo, and operating their own winery since 2006. Long-time proponents of sustainable farming efforts, the family members belong to numerous conservation organizations, employ the Lodi Rules sustainable practices guidelines, and land-apply their treated wastewater. Lange Twins is installing a 250 kW solar system for winery operations in 2007.

In 2004, Lange Twins installed a 20 kW solar array to power one vineyard irrigation pump. Brad Lange and vineyard manager Aaron Lange brought the irrigation system to peak efficiency before installation of the solar array. Going back five years to study Lange Twins’ energy use and efficiencies, engineer Darryl Conklin (Renewable Technologies, Sutter Creek, CA), was able to measure an appropriate solar array size for their needs. Thus, it takes only a 20 kW array to power one 50hp deep-well water pump and irrigate 150 acres.

“We ensured there was no off-site irrigation run-off, checked to see the soil permeability was good, completed a pump efficiency test (and made appropriate corrections), and checked the water distribution uniformity of the drip system,” Aaron Lange explains. “These are all normal vineyard and drip system maintenance activities.”

Conklin helped arrange a specific pump efficiency test on the 11-year-old pump, financed by PG&E to encourage irrigation efficiency. A professional tests the life-cycle, wear, and pump housing to be sure it is in perfect working order and has a long potential working-life.

For water distribution uniformity, Lange checked for leaks, build-ups, and clogs in the valves, header manifolding, and drip emitters. Emitter output was measured to see that they were issuing correct amounts of water per hour, and showed equal water distribution all the way out to the end of

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Merryvale Vineyards had Novato-based SolarCraft recently cap its winery roof with state-of-the-art photovoltaic panels. The new roof provides 277kW — enough to power 100% of the winery’s electric needs.

“Solar energy is good for the environment and reducing greenhouse gas is good for the community.

“With rising energy costs and generous rebates currently offered, solar was an easy decision,” says Alex Gunst, Construction Project Manager of Pound Co. “SolarCraft was very flexible and their professionalism was exceptional.”

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irrigation lines. The irrigation water filter system, which filters groundwater before sending it to the pumps for irrigation, was cleaned and its pressure checked. Crews also checked the ability of the well to provide water on-demand, in any amount required, when the system came on to pump it.

Lange wants to be able to irrigate at specific times based on vineyard needs, which is decided by both visual attention and scientific measurement. "We do not have a specific irrigation regime or schedule," he explains. "We try to run the pumps at night only, but we will irrigate our vines when they need it, as the situation demands (weather, soil, and vine health conditions). Neutron probes and a pressure chamber are used to monitor the water status of vines and soils. We spend a lot of time visually monitoring vineyards to decide when to irrigate. Our irrigation practices are never done on a 'blind schedule'."

Conklin wired the pump in a unique fashion. "We retrofitted the electricals at the pump station to incorporate solar power. The solar panels are hooked up to the grid but also to the pump. If Lange Twins runs the pump only at night, when the sun is not shining, they are pulling electricity from the power grid. However, when they irrigate during the day (while the PV cells are producing power), the pump draws power directly from the solar panels. If the pump lacks power to run properly during this time, it will pull from the grid to complete its needs."

A second 10kW array in another Lange Twins vineyard is similarly wired for power generation and usage. The 10kW array operates a 40hp pump, irrigating 110 acres (on four vineyard blocks). A 65 kW array powers the mechanical shop and offices.

Oakville Ranch Vineyards, Napa, CA

In March 2007, a 140 kW solar system went live at Oakville Ranch Vineyards (ORV). Installed by John Hubenthal of Marin Solar, the system has three arrays: a 92kW "main array;" a 30 kW "plateau array;" and a 5kW "bobcat array." There are five meters on the system, which is grid-tied to the utility. All arrays face true south.

ORV based the size of the arrays on their plans to expand vineyard plantings by increasing density in existing vineyard blocks, and also installed new pumps prior to installing the solar power.

Philip Coturri (Enterprise Vineyards), came on board to manage ORV vineyards and implement a five-year plan. "Once my company was hired to manage ORV, the first step we took was to do an irrigation

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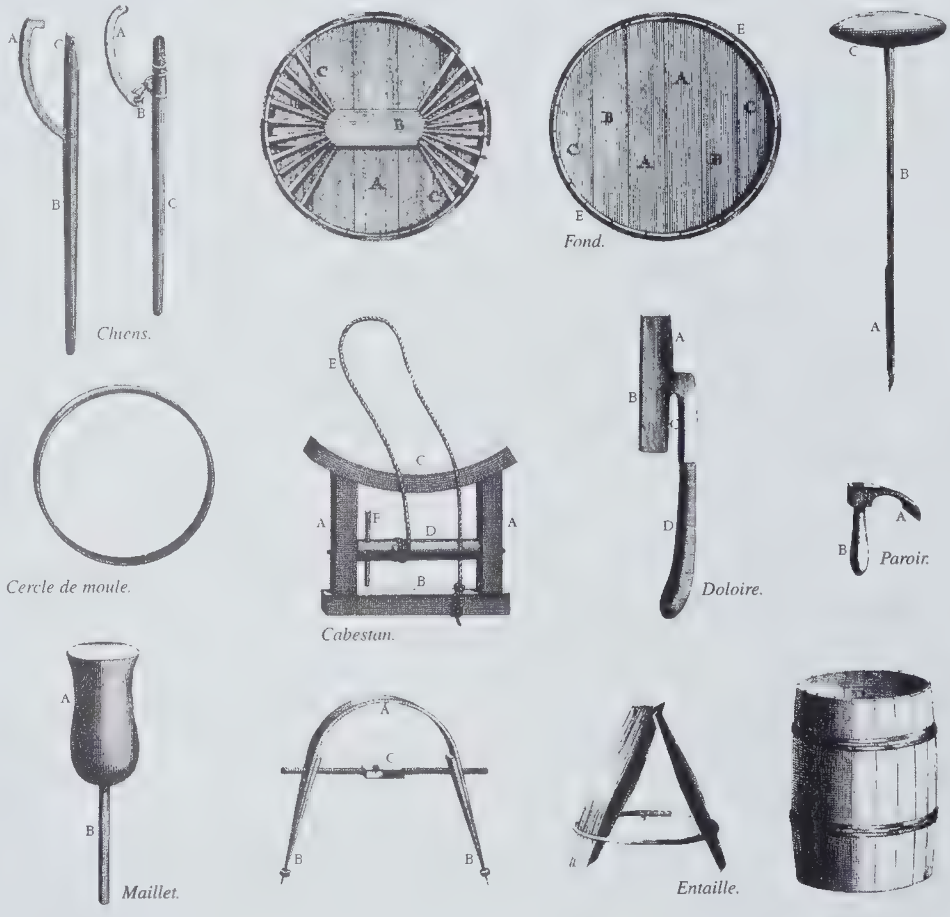

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The LangeTwins believe strongly in enhancing relationships through participation as leaders on local, state, national and international issues. Organizations that both Brad and Randy support include:

- *California Agricultural Leadership Program*
- *California Association of Winegrape Growers*
- *Lodi-Woodbridge Winegrape Commission*
- *San Joaquin County Business Council*
- *San Joaquin Farm Bureau*
- *Multi-Species Habitat Conservation Advisory Committee*
- *The Agriculture Farmland Trust Board*
- *CDFA Pierce's Disease/Glassy Winged Sharpshooter Board*
- *Lodi District Grape Growers Association*
- *Wine Growers of America*

Brad and Randy are also leaders in alternative energy use, both in the vineyards and at the winery.

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To learn more about the LangeTwins, and the great wines they produce, please visit their winery at 1525 East Jahant Road, Acampo, CA 95220, or on the web at www.LangeTwins.com.

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10kW array at Lange Twins operates a 40hp pump, irrigating 110 acres.

efficiency study. ORV is currently 70 acres of vines over 150 acres, with elevation changes of over 300 feet. As we re-develop ORV, we'll use this study to create a state-of-the-art irrigation system."

ORV recently planted eight acres, and they are in the process of installing more efficient irrigation on all vines. The plan is to have a dual drip system, with the primary system watering an entire block, and the secondary system watering only areas of the block with special needs, such as rockier, thinner soils. The dual system will allow ORV to conserve water while creating uniformity within a block.

Three wells feed a storage system of over 100,000 gallons, and from

20 kW array at Lange Twins powers an efficient 50hp deep-well water pump to irrigate 150 acres.

Oakville Ranch's 30 kW plateau array on an engineered steel structure in the vineyard, is 10 feet from the irrigation pump.

there, 90% of the vineyard water is gravity-fed. The remaining 10% will be on a pressure system run from a variable speed pump that is designed to use the least amount of energy possible.

ORV is currently irrigating about 65 acres, with flow rates of 75 gpm per set. They cycle the vineyard in six days, giving each vine 12 gallons of water.

The solar arrays are stationed at strategic positions on the ORV property. Half of the 92kW main array provides power to houses and outbuildings on the property, while the other half powers a well pump feeding the tank farm. The 30 kW plateau array is set on its own engineered steel structure in a vineyard, 10 feet from the irrigation pump which it powers. The 5 kW bobcat array is located about 35 feet from a pump.

Like Lou Preston, Coturri knows that making the soils healthier is also going to conserve irrigation water. "One of the main tenets of organic farming is to increase soil tilth. By making the soils healthier at ORV, we will be able to increase moisture-holding capacity, and thus conserve water. Irrigation is a tool that must be used efficiently both for sustainable practices and wine quality."

ROBERT KEENAN WINERY, St. Helena, CA

Before Robert Keenan passed away in 2006, he installed solar power for the

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family's home and told his son Michael that eventually the winery should be solar-powered also.

Keenan's Chardonnay field is now lined by 29 solar arrays. Keenan Winery's solar power system was designed and installed by Sunlight Electric (San Francisco, CA). The 41.3 kW system will generate 100% of the electricity needs for the winery, vineyard irrigation, and three residences (the cellarmaster's house, the tasting room manager's house, and a guest house).

Keenan's wine cellar is already quite efficient in terms of ambient cellar temperature. The cellar is built into the hillside and the exposed face of the cellar is north-facing — thus requiring no climate control. Over the last few years, water heaters and a glycol chiller have been replaced with more efficient models. The winery underwent the now-required (as of 2007) energy audit before state rebates could be applied to the incoming solar system.

With a limited choice of where to install solar panels on the property, Sunlight Electric designed a unique system of 29 pole-mounted arrays at the end of vineyard rows, each with 10 BP Solar 170 kW modules. The pole-mount arrays are 10.5 feet by 13 feet and the system has 15 inverters that feed Keenan's five utility meters.

"The minimum height clearance under the panels is over nine feet to provide tractor access underneath," reports Rob Erlichman of Sunlight Electric. "Matt Gardner (winery general manager) and his team built a 'test-rig' and ran tractors and equipment under it to test clearance before we established the 9-foot height.

"The arrays face due south at a 10-degree tilt, mounted on six-inch diameter galvanized steel poles on the north end of Keenan's Chardonnay vineyard, where vine rows run north-south.

"This creative placement enabled Keenan to 'find' space for solar power where there previously was thought to be no space available," notes Erlichman.

The shadow of the arrays is on the tractor turnaround space and not on the vine rows. With the location in a busy vineyard, recommended maintenance of the solar panels is two hose-downs to remove dust each summer; rain will wash them clean in winter.

The irrigation system powered by Keenan's solar energy waters 48 acres of vineyard from a 5-acre-foot reservoir.

"Keenan has been forced to use available water efficiently from Day-One," Gardner reports. "We simply don't have much water to begin with. In most years, we do have high rainfall (average around 55 inches per season), but this water percolates to lower elevations quickly."

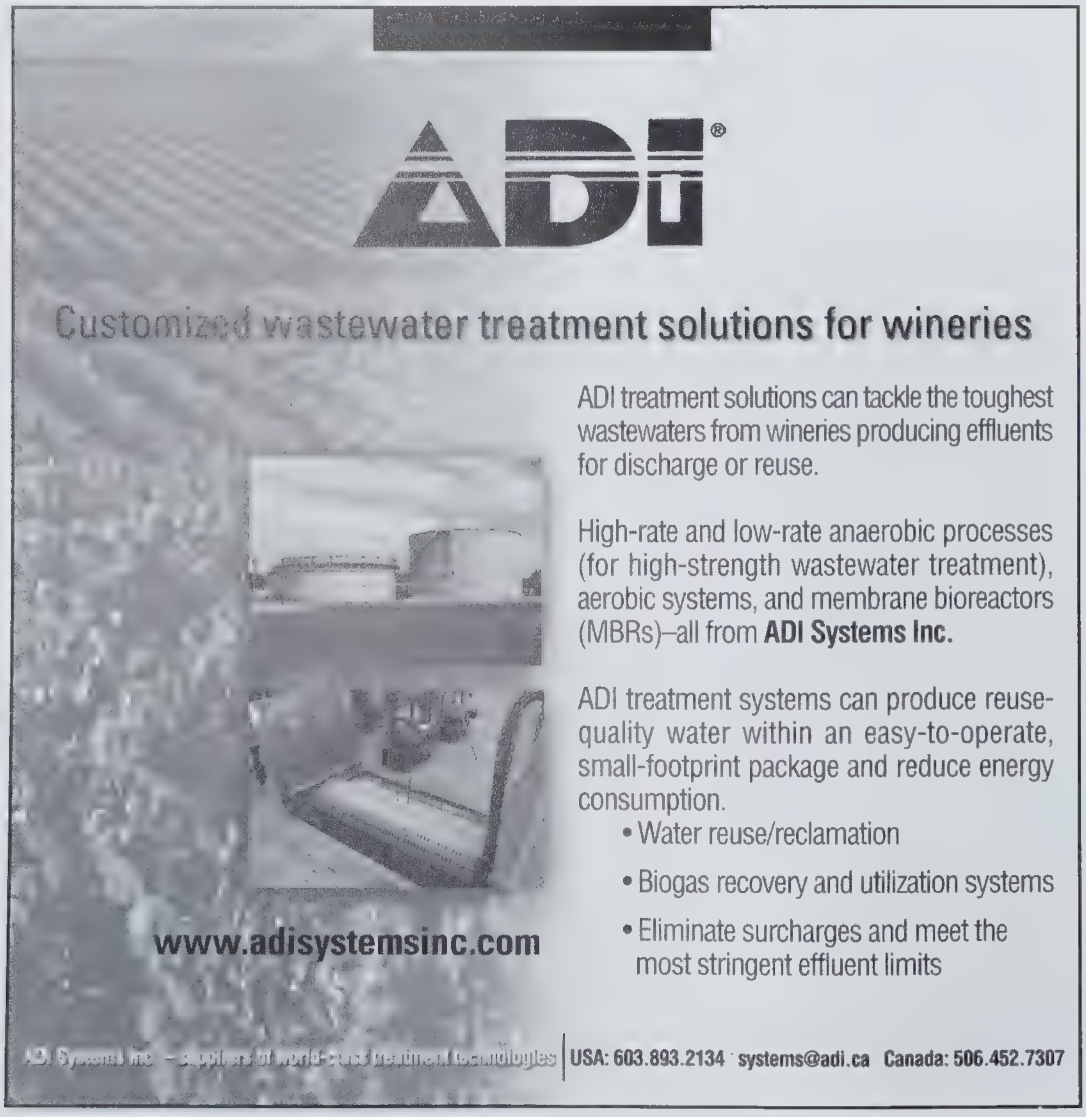
Keenan vines are planted on drought-tolerant rootstock, primarily 110R. Vineyards are pruned and thinned to provide moderate crop loads, allowing vines to better support the crop through the summer. The pressure chamber method is used to determine when vines need to be irrigated — eliminating unnecessary irrigation. Some vineyard blocks on the property haven't been irrigated in years, and are doing just fine. Other blocks do require irrigation; each block is addressed individually in terms of water needs.

Keeping a close eye on blocks being irrigated assures that, when a line breaks or emitters/valves leak, repairs can be made quickly.

Keenan has one 10hp booster pump to pressurize the water captured in the reservoir, one 1.5hp well pump, and one 2hp sump pump. These three pumps provide water for irrigation, residential, and winery needs. The pumps are AC-powered.

Gardner says drip irrigation is all manually controlled, with one 0.5 gallon (2 liters) per hour emitter for each vine. Maximum flow rate for irrigation is about 30 gallons per minute, and average pressure is 30 psi along the lines. This is a slow application rate, but leads to less runoff.

Keenan vineyard manager Peter Nissen (Nissen Vineyard Services), reports average usage is between 0 and 65 gallons per vine per season.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"The 65 gallons per vine is the maximum average usage in a small 4-acre block with soils even more rocky and porous than other areas on the property. I estimate the weighted average per vine water usage is around 30 gallons per vine per season."

Using renewable energy is an increasingly important response to the global situation, as well as smart business practice. When the irrigation system you're powering with solar is also as efficient as it can be, your vines and your business get the best possible benefits.

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In 2007, Shafer Vineyards contracted Premier Power (El Dorado Hills, CA), to install additional solar power to augment a 129 kW system installed in 2004 [see *PWV*, July/ August 2005]. The new 100 kW array will be located between an irrigation pump and the winery wastewater pond. The energy produced will irrigate 54 acres of hillside vineyard surrounding the winery.

"We'll be running our wastewater system, pond aerators, vineyard irrigation, and any future winery equipment acquisitions with the additional solar power," says Doug Shafer (owner).

The water source for irrigation is a large pond with a curtain dividing the water from two sources — one of winter rainfall capture and runoff, and one containing recycled water from the winery. A 3hp Aquajet aerator operates on the rainfall side of the pond, while a 10hp aerator cleans the winery wastewater. Shafer reports the aerators are run year-round, daily from one to three hours per day depending on the season and the waste loads in the pond.

The 17-year-old winery wastewater system (that will be also powered by solar), includes a machine separating solids from liquid waste materials, and two pumping stations.

For irrigation, a 20hp pump runs on AC power and manual controls. Vineyard manager David Illsey's irrigation strategies are site-specific. "We irrigate vines in blocks. The approach changes with block size and its needs, day by day." ■

Resources

David Henry and Chad Griffith, Harmony Farm Supply, Sebastopol, CA; www.harmonyfarm.com.

Mike Morris, Vicki Lynne, NCAT energy specialists, National Center for Appropriate Technology, PO Box 3838, Butte, MT 59702, 800/346-9140; www.attra.ncat.org.

Warren Brown Construction, Graton, CA; www.warrenbrownconstruction.com.

Darryl Conklin, Renewable Technologies, Sutter Creek, CA; www.renewable.com.

Rob Erlichman, Sunlight Electric, San Francisco, CA; www.sunlightelectric.com.

John Hubenthal, Marin Solar, San Rafael, CA; www.marinsolar.com

Dean Marks, Premier Power, El Dorado Hills, CA, www.premierpower.com.

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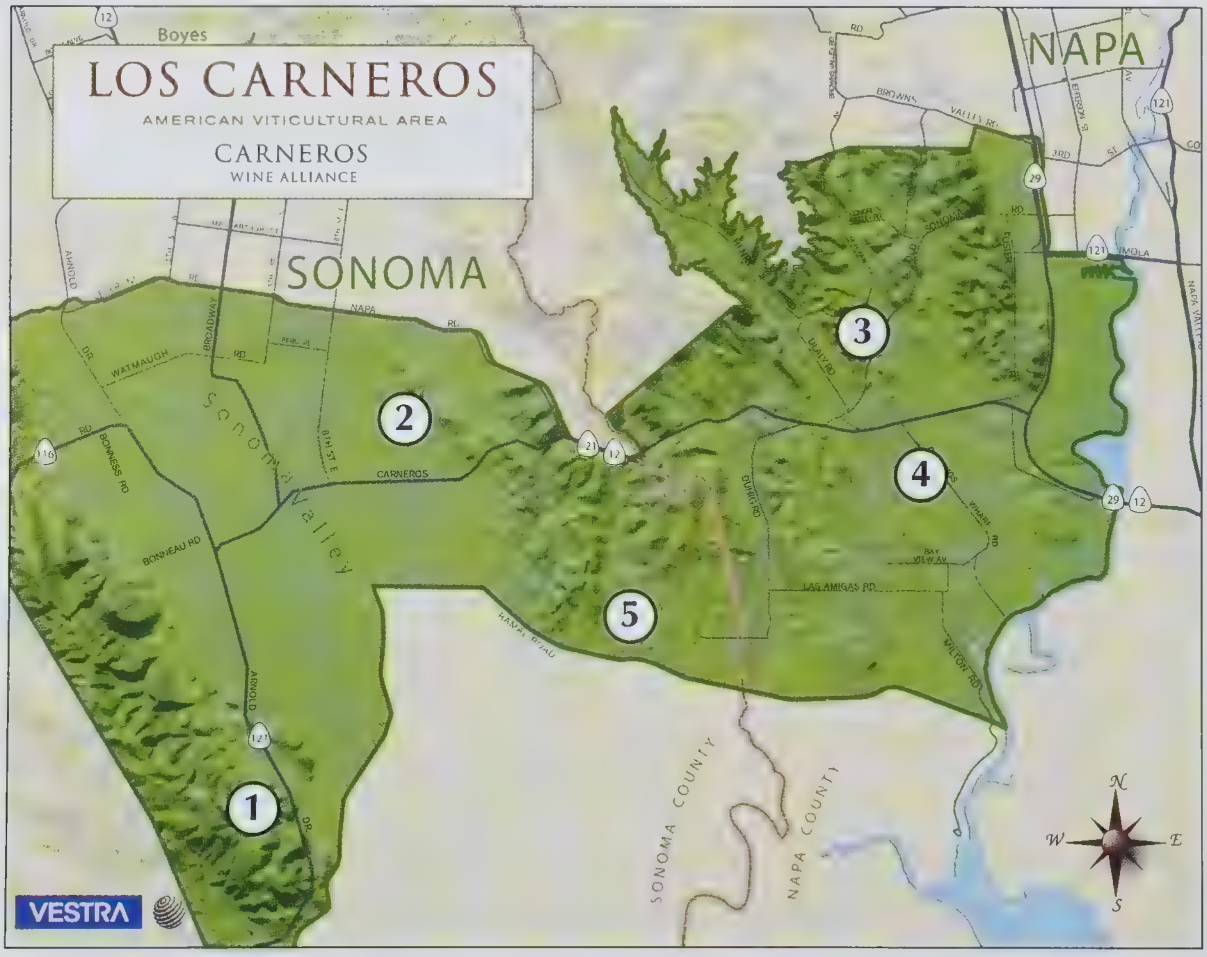
PINOT NOIR

Individual expressions from Los Carneros

BY Eleanor & Ray Heald
Contributing Editors

California's American Viticultural Areas (AVAs) have generally been drawn with boundaries representing political, geographic, and climatic considerations. Boundaries for California's Los Carneros AVA were, however, drawn only upon consideration of geographic and climatic conditions, such that the AVA crosses political boundaries of Sonoma and Napa Counties.

Cool climate Pinot Noir finds a unique home in Los Carneros. Yet, each vineyard, planted to various clones on a variety of rootstocks in divergent soil types, uniquely expresses Pinot Noir. A roundtable discussion with three producers explains how each achieves an individual expression of Los Carneros Pinot Noir from specific vineyards.



1) MacRostie estate vineyard, Wildcat Mountain. 2) MacRostie Winery. 3) Saintsbury Brown Ranch Vineyard. 4) Saintsbury Winery. 5) Buena Vista Carneros Winery & Ramal Vineyard.

Background

Set along wind-impacted rolling hillsides, with varying aspects overlooking San Pablo Bay, Buena Vista's Ramal Vineyard has 760 acres under redevelopment — a project to be completed in 2010. Based on topography, geology, and microclimates, vineyard parcels are divided into 167 blocks, 50-plus for Pinot Noir across 335 acres.

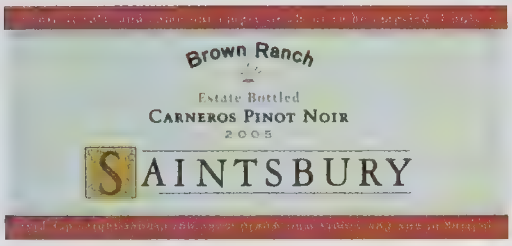
Pinot Noir bottlings from this vineyard redevelopment are featured in the Buena Vista Carneros Estate Vineyard Series tier. The 2005 Ramal Vineyard Pinot Noir bottling was 8% of the 2005 Buena Vista Carneros Estate production.

Commitment to the Los Carneros AVA is an important aspect of MacRostie wines. Proprietor/winemaker Steve MacRostie's long-term goal has been to obtain and maintain control over a significant portion of his grapes.

In 1998, the first MacRostie estate vineyard was planted on Wildcat Mountain in the western highlands of Carneros to what he considered the most enduring rootstocks and best clones farmed under exacting practices. Currently, 20% of this fruit is bottled as MacRostie Wildcat Mountain Vineyard-designated Pinot Noir.

Wildcat Mountain benchland was pasture land owned by the family of Nancy Donnell Lilly, with whom MacRostie established a partnership to jointly develop the vineyard. In 2006, the first Pinot Noir wine from Wildcat Mountain Vineyard was released from the 2004 vintage. Although geographically part of the Los Carneros AVA, the vineyard is also technically in the Sonoma Coast AVA, which MacRostie uses as the AVA on the label.

In 1992, Saintsbury planted Brown Ranch with its typical Carneros gravelly clay loam soil and some volcanic soils on 29 acres of rolling topography. Several Pinot Noir clones are planted on five rootstocks which are impacted by several soil types and exposures. First harvest of Pinot Noir from Brown Ranch was the 1996 vintage and now,



Pinot Noir on the rolling topography of Saintsbury's Brown Ranch with gravelly clay loam soil.

60% is used for the Brown Ranch-labeled wine.

Vineyard environment

Because Wildcat sits in a fog layer, there are significant disease pressures and thus MacRostie describes his practices as sustainable and environmentally-sound.

Saintsbury is a member of the Napa Sustainable Winegrowers group. "The hangup," vineyard manager Randy Heinzen says, "to farming organically is finding a suitable fungicide program given the disease pressures of grapegrowing in Carneros. We employ mechanical methods for weed removal but we have serious concerns about an ATV with one pass of Roundup, in contrast to three passes with a diesel-powered tractor.

"We've developed a hybrid farming method where, to knock down the initial thrust of weed pressure, we use Roundup in December in a strip under the vines. That suffices if there are not heavy Spring rains. If there's a significant regeneration of weeds in Spring, then we mechanically-till."

Buena Vista is also sustainably farmed. Craig Weaver, vineyard man-

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ager, hopes to reduce the number of inputs and yearly tractor passes that will be key to sustainability. "Organic viticulture has come a long way over the years, and is something to consider in the future," says Weaver.

Volcanic soil first and climate secondarily attracted MacRostie to Wildcat Mountain. The appreciably exposed site has a higher elevation than most of Carneros, therefore it's cooler with less heat accumulation. Wind (10 to 15 miles per hour) is a significant influence in Carneros but with greater impact at Wildcat, where it affects set in springtime and therefore crop levels.

Diversity of new plant material has made the biggest impact at Buena Vista Carneros with 20 Pinot Noir clones including Dijon 828, 777, 743, 667, 114, and 115, along with 2-A, UCD-4 and UCD-5 (often referred to as Pommard), 37 (old Mt. Eden clone), Martini (UCD-13), 538, 23, and Swan selection.

"These were planted to capture different aspects, slopes, and soil changes," Weaver says. "We also do multiple picks of the vineyard. In the 2005 harvest, we picked over a 20-day period in September. In 2006, we picked over one month."

In replanting Ramal Vineyard, Weaver had an opportunity to match rootstock to soil, hence the reason for so many small blocks. "We reduced block sizes from formerly 20 to 25 acres to smaller blocks ranging from 2.5 to 5 acres," he explains. "Because we essentially started over, we had the opportunity to set irrigation blocks to not water-starve one vineyard block while over-irrigating another."

Rootstock selection was made to accommodate soil types. "As a general statement," Buena Vista Carneros winemaker Jeff Stewart says, "we tend to have fairly thin soil profiles in Carneros. Many sites have 28 inches or less top soil."

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Saintsbury winemaker Jérôme Chery comments, "Style consistency from Brown Ranch has been attained now because we understand block nuances and do a lot of intra-block picking."

Scion performance

Wildcat Mountain clones include UCD-4, Dijon 667, 777, and 115. Because the Swan selection performed poorly on this site, producing less than one ton per acre, it has been replaced recently by UCD-5.

"Dijon clones are performing consistently," MacRostie notes. "There are subtle differences but all the clones make fine wine. Each year, 667 makes the most well-rounded, fruit-complex wine and always is part of the Wildcat blend.

"Interestingly, UCD-4 often makes a very tannic, highly-extracted wine — one that's good for blending but that does not sit alone well. Dijon 777 is elegant with perfumed aroma, but lacks structure to stand on its own."

Heinzen considers UCD-4, planted on rockier soil to check its inherent vigor, a standout and the backbone of the Brown Ranch blend. "With heat waves that we've been experiencing over the last several years," he says, "UCD-4 has not suffered severe desiccation."

He cites Dijon 115 as a favorite and 667, which is planted on two different rootstocks on two distinct parcels, as the perfume note of the wine. In a challenging bloom year, 777 has more space between berries within the cluster and limits crop size naturally.

"Variable maturity levels within 777," Heinzen stresses, "are tough to gauge unless a thorough sampling is taken before picking."

As noted earlier, Ramal Vineyard has a wide variety of Pinot Noir clones planted. "You could throw all of those clones together and have a big mess," Stewart indicates, "or you could have something interesting. For us, it's the latter because we've been able to create an amazing palette of characteristics to work with.

"Most consistent performer is UCD-5. UCD-4 always seems to be a fruit-centered base in the blend. It's not the flashiest but tends to be a good core. Thinner soils with 115 produce high-toned spice characters. Wines with structure come from 667 and 777 on thinner soils.

"Clone 828 is new and we're still sorting it out but it's showing promise. In vintages like 2004 and 2006 when it shines, we do single-vineyard bottlings of the Swan selection. On lighter soils, Martini (Clone 13) makes a beautiful, floral, and delicate wine but a powerful one on heavier soils.

"Given that Buena Vista is sourcing only from Ramal Vineyard, keeping a balance is advantageous. We're also looking at newer clones, such as 943 and other mass selections. Clone 538 is a cross-over clone for a number of growers. It has big

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clusters and good fruit intensity but not as much structure as we'd like to see."

Martini Clone 13 is also planted on a mix of rootstocks, including some young plantings on St. George, which worked on the site in the past.

Rootstock selections

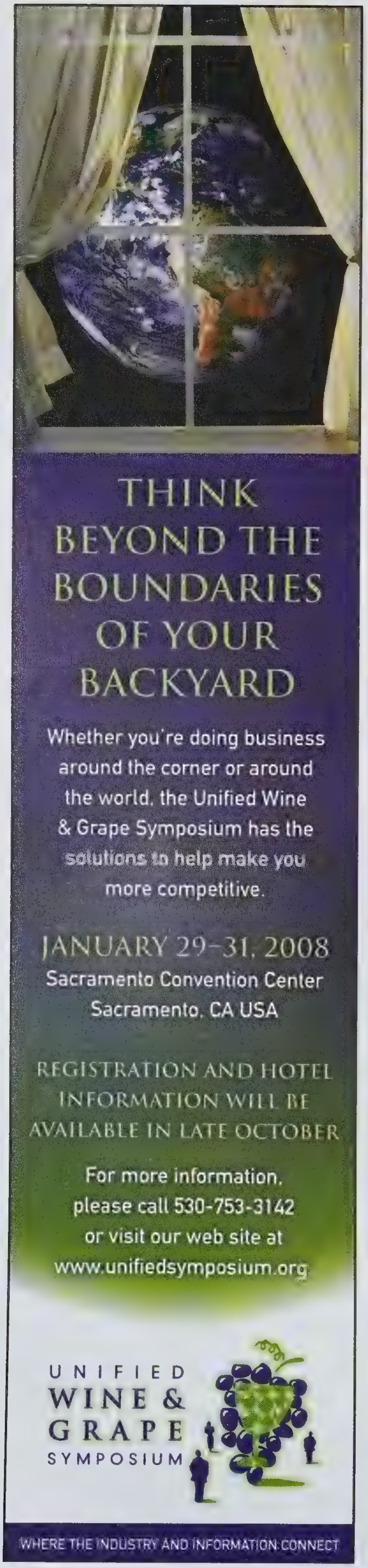
MacRostie says rootstock selection of 101-14, 3309, and 110-R were made on what would likely be successful. He asked for opinions from many growers and at the time of planting, did what he thought best to match rootstock with site, soil, and clone. Currently, he does not see significant difference in the way the chosen rootstocks perform.

In 1992, Heinzen notes, "because the clones we chose for Brown Ranch were so new, the strategy was to target vine balance through rootstock/soil combinations and put clones on each rootstock. This resulted in each block having a common rootstock with two or three different clones on top.

"We have two clones on 420-A and 1103-P; all three on 3309, and UCD-4 on 110-R and 140-R in gravelly, clay loam."

With respect to latent viruses showing up across the graft union, Weaver notes it has not been experienced to date on Pinot Noir but it has been the case with other varieties.

Mechanical leafing of Pinot Noir vines at Buena Vista Carneros Ramal Vineyard.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MacRostie uses 20% of Wild Cat Mountain Vineyard Pinot Noir for the vineyard-designated bottling.

Planting density and vine age

Best-guesses governed planting densities at Wildcat Vineyard, resulting in 8-foot wide tractor rows and five feet between vines (1,089 vines per acre), which was typical at the time. “If I were to do it now,” MacRostie maintains, “I'd reduce the spacing between vines. In the early years, I was concerned about being able to fill the canopy. As it turns out, they've filled out OK.”

At Wildcat, vine age has made a dramatic difference in wine quality. MacRostie has heard some growers say that first production years were quite good, but his were not. Increased quality was experienced beginning with the sixth leaf.

Vine spacing at Brown Ranch is 8x5. To match contour, some blocks have 10-foot wide rows. Heinzen echoes MacRostie in stating that if he could make spacing choices now, he'd choose four feet between vines — not only to fill the canopy, but because of high eutypa pressure (at least 10% to 15% of vines show symptoms and have been treated).

“If vines do become infected,” Heinzen explains, “and the cordon is cut back, there's less replacement time. Now that the vineyard is 15-years-old, we're starting to see more eutypa and it's our number-one concern and what we spend more money on than any other operations.”

At Ramal Vineyard, vine density is 8x5.5 and 8x5, provided that plantings are not on hillsides with a 30% slope. Presently, Weaver does not view eutypa as a serious problem.

Cover crops

Vigor variability at Wildcat requires a highly-detailed plot plan for all till, alternate-row till, or no till. Some areas continue to grow very vegetatively and attempts are made to keep shoot lengths contained by leaving a cover crop. Native grass is disked in where vines need to be strengthened.

Brown Ranch was planted under one of the first Erosion Control Plans by the Napa Resource Conservation District. It therefore has guidelines on what can be tilled. Since the beginning, most of the vineyard has a permanent cover crop. Heinzen believes that a cover crop is the number one

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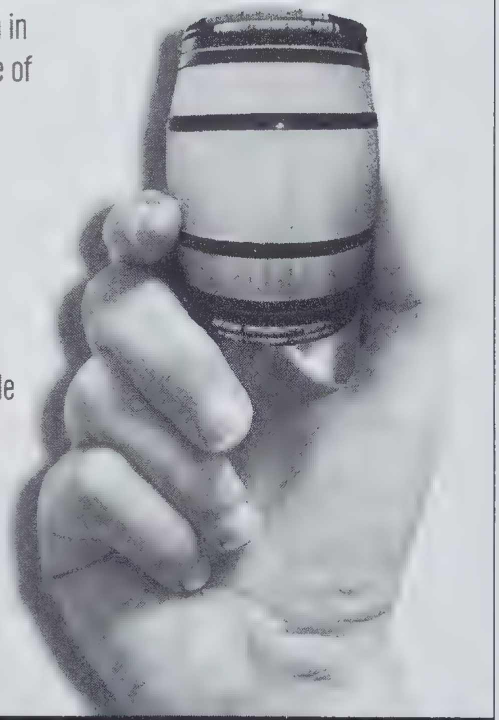

tool for reigning in early season growth, This was especially true in 2005 and 2006 with late Spring rains.

Starting in 2003, Saintsbury obtained permission from the Napa Valley Resource Conservation District to begin revamping cover crops because of weed intrusion. Reseeding gave Heinzen an opportunity to match cover crop on a block-by-block, and even row-by-row basis.

For new cover crops, specific blends of seeds are used in accordance with current understanding of block vigor. Good stands of native grasses have been developed and on blocks where 420-A is the rootstock, zorro fescue and a single clover has been seeded.

Organic soil builder is used at Buena Vista where attempts are being made to increase organic matter. Deep-rooted trios wheat and chicory are used to control vine vigor.

Training and trellising

Vertical Shoot Positioning (VSP) with three moveable sets of wires is employed exclusively at Wildcat. Vines are cordon-trained, spur-pruned with six positions on either side of the cordon, leaving 24 buds/vine.

In an attempt to attain bud fruitfulness and more consistent crop levels, two newly-budded blocks are now cane-pruned. "We grafted Swan selection Pinot Noir to Chardonnay clone-4 and Syrah Noir to Pinot Noir UCD-5."

A unilateral spur-cordon system is Saintsbury's chosen training method. Belief is that a unilateral system leads to a more continuous canopy and minimizes compaction in the fruit zone.

Weaver's practices are similar to what the others report but explains that a tuck-in system on newer plantings replaced three sets of moveable wires.

"A set of three six-inch cross-arms allow ample room for vertical shoots to not be crowded," Weaver says. "Vines are pruned to six spurs on each side of a bilateral system, or about 12 buds per cane."

Hedging is used to modify canopy. However, irrigation is the preferred modification method. "Hopefully," Weaver says, "we've matched rootstock to soil correctly. That in combination with proper irrigation should keep hedging to a minimum."

Balancing yield

On average, Wildcat Vineyard yields two tons/acre (TPA). At lag phase (when berry seeds begin to harden), MacRostie does a crop estimation and develops a data base of factors that create a relationship between cluster weight at that time and mature cluster weight. Based on that, MacRostie assesses whether there's need to drop clusters at that point. Given Wildcat history, dropping fruit has not proven necessary on this self-limiting site.

"We're all striving to have as many clusters getting ripe at exactly the same pace," MacRostie contends. "At veraison, any clusters lagging in color development and therefore ripeness, are green-harvested. At this point in the growing season, one must be thinking quality wine and do whatever is necessary to achieve it."

Generally, Heinzen explains, thinning to a target yield is unnecessary at Brown Ranch. Saintsbury is a big proponent of what it calls "setting the table," and that's achieving yield control through pruning. A green harvest is done at 75% to 90% grape coloration. Clusters with half green berries are dropped. When there are 20 to 25 clusters/vine, two clusters are generally dropped.

If projected yields after estimate approach 4 to 5 TPA, then adjustments are made. Heinzen says that Saintsbury is philosophically against adjusting to a prescribed crop level and generally achieves between 2.25 TPA on dry-farmed blocks to 3.5 TPA as an upper limit on UCD-4 and 777 blocks.

Taking a balanced vine approach, Weaver uses cane weights to project pruning tactics. Attention is given to occasional clumps at points where two cordons meet. This tactic promotes balanced vines. Green dropping is done at 80% grape coloration.

Irrigation

At Wildcat Vineyard, a pressure chamber is used to monitor leaf water potential in vines and determine when to start irrigation. Once irrigation begins, watering is a best guess because MacRostie has discarded all information provided by researchers on the use of the pressure chamber because of lack of water at the site. Leaf water potentials are retained at about –12 bar.

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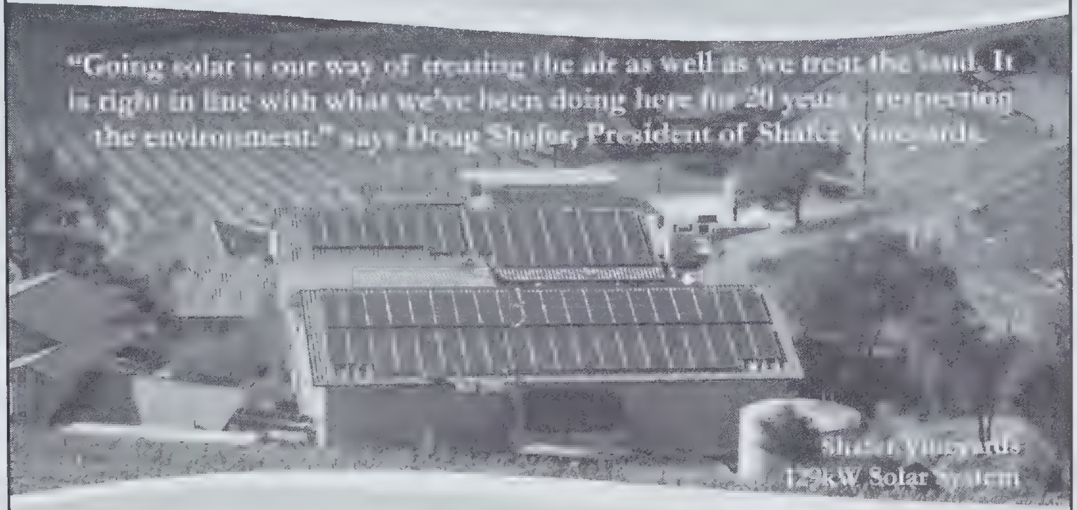

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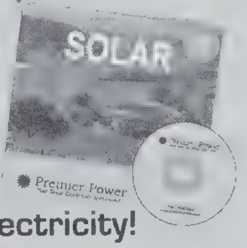

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A separate issue is created in spots where Wildcat Vineyard displays irregular vigor within the same block. Irrigation in such cases is based upon needs of the most stressed vines and is maintained until harvest.

Two blocks on Brown Ranch are not irrigated. Vines on 420-A rootstock can receive up to 60 gallons per vine from in-season irrigation. Due to high moisture-holding soils, Heinzen can wait well into the growing season to begin irrigation.

"We like to avoid hedging and bring vines into balance prior to starting supplemental irrigation in late June or early July," Heinzen says.

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Tools used are the pressure chamber, neutron probe, and four phytograms (water content measurement device in the vine which establishes a stress index allowing monitoring of a hydration-dehydration curve of the vine).

Once irrigation is initiated, evapotranspiration numbers from the previous week are used as a guide. "Irrigation is driven by tools and what information they give us," Heinzen adds," but final decisions are made at a weekly meeting based on walking all the blocks and deciding what seems sufficient or may have been overdone.

"Irrigation strategy through harvest is keeping water on the vines up to harvest, perhaps cutting off three days before. But by then decisions are more weather-driven."

Weaver uses aqua probes to check soil moisture and the leaf water potential at –12 to –13 bar. "We apply," Weaver estimates, "approximately 0.50 to 0.60 acre-foot of water per acre. In higher vigor soils, we've elected to reduce two half-gallon emitters to one per vine, as opposed to the other option which is to pick the block twice.

"In the pre-harvest period, if we were at six hours of irrigation, we drop to two hours to keep the vines happy. Yet, if there's colder weather at harvest, there may be weeks when we don't irrigate."

Stewart adds, "We try to play weatherman well in advance if heat spikes are predicted, rather than reacting to heat and irrigating when, at that point, it really has little value. Vines need to be protected by irrigation in advance of heat spikes."

Harvest maturity

Number values for Brix, TA, and pH give MacRostie a guide to begin harvest. Wildcat is picked between 25 and 26° Brix, with TA averaging about 0.60. "We like to see ripe fruit flavor in the juice and berries, free of green or herbal notes," explains MacRostie. "Seeds must be brown in color and 'crunchy' in texture. Skins, when less harshly tannic, softer in taste, reveal the readiness for a block to be harvested."

Because of Brown Ranch vine age, Chery reports a picking history. Typically, UCD-4 is picked at higher Brix than Dijon clones. Brix levels can range 23° to 27.5°. "Although 23° Brix

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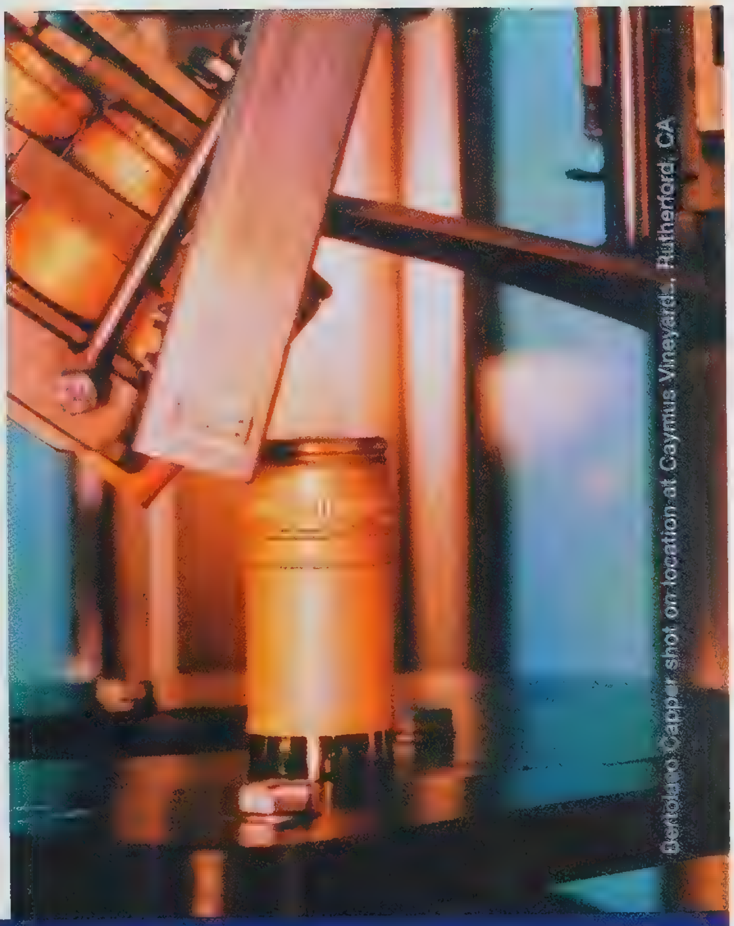

Bertolaso Capper shot on location at Caymus Vineyards, Rutherford, CA

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sounds low," he says, "if flavors are there, we pick. Brix is not a huge criteria for us. It is, however, when we approach high 27°."

Stewart monitors the standard numbers, but he focuses on seed and skin maturity. Often seeds tell the story, yet skin taste is more important as it pertains to tannin development. At the low end, Ramal Vineyard is picked at 24.5° Brix but more likely 25.5° up to 27.5° and 28°.

Harvest, says Stewart, is all about walking the vineyard and chewing on grapes and making calls block by block.

Wildcat winemaking

Hand-harvested grapes at about 65°F are destemmed. All lots are given a 3-day cold soak with 60 ppm KMBS, then inoculated with either Assmanshausen or RC212 yeast at 2 lbs/1000 gal., with a cocktail of Superfood, DAP, and Cerevit (vitamins).

Any soaked-up Brix levels higher than 25.5° are watered back to that point, or 25° in closed-top tanks. Combination lots of clones 777 and 115 receive ColorPro enzyme during cold soak. An acidity analysis is done to calculate any tartaric additions.

All tanks are pumped over once daily during soak. After inoculation, juice receives two punchdowns per day in open-top fermentors but pumpovers on closed tops, with some tanks getting complete drain-and-return at least once halfway through fermentation. Tank-jackets are set at 85°F, allowing cap temperatures to max out in the low to mid 90s.

At least one pumpover is done on each open-top tank prior to drain and return in order to filter free run with the cap. Pressing varies with the character of individual lots, but generally, it's around 0° Brix. The hard press fraction is separated.

All lots are settled in tank overnight post-pressing, then racked off gross lees, inoculated for malolactic fermentation (MLF), and barreled down. Cooperage is 100% French oak (primarily François Frères and Remond, both Allier medium-plus), 30% new.

SO_2 at 60ppm is added to barrels on completion of MLF. One racking under gas is done in March to create the blend, then the wine is returned to clean, ozoned barrels. SO_2 levels are adjusted to maintain 30 ppm free and barrels are topped monthly.

Wine is racked to tank under gas in late July. It's not fined but is filtered with DE, two passes, with the second tight enough to achieve Brettanomyces sterility (subsequently verified by plating). In the first week of August, the wine is bottled without a sterile membrane on the bottling line for release one year later.

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Brown Ranch winemaking

Night hand-harvested grapes at about 50°F remain as 5% to 15% whole clusters (for enhanced aromas of Asian spice, round mouthfeel, and ultimate tactile sensations) with the balance de-stemmed.

Saignée (juice bleeding) is done to 5% to 10% of the tank volume. All lots are given a 5 to 6-day cold soak at 50°F to 60°F with 40 to 50ppm SO_2 and dry ice under a protective plastic covering the tank. Lab analysis indicates whether yeast nutrient additions are needed.

Tanks are warmed to 70°F and inoculated with a Williams Selyem yeast isolate. Clones are co-fermented. As an example, Chery indicates that with a dry-farmed block of co-fermented 667 and 777 clones, 777 is enhanced more than if it is fermented on its own.

Punchdowns are done three times daily with an occasional gentle five-minute pumpover to even-out the cap. Maximum fermentation temperatures reach 88°F to 90°F. Approaching dryness, a plastic disc (used during cold soak) and dry ice are again placed at the top of the tank to prevent oxidation.

Every lot goes to dryness with a total skin contact time of about 14 days before pressing. The first press fraction (max pressure 0.80 bar) is added to the free run.

Lots are settled in tank for 24 hours, then racked off gross less, inoculated for MLF and barreled down. The goal is to achieve MLF completion before November because Chery believes the longer it takes, the more the door opens to Brettanomyces. ML lees are retained until blending is done in March or April.

Cooperage is 40% new François Frères and Taransaud, center of France barrels, until blending. Then wine is barreled in one-year-old Taransaud cooperage until sterile filtration at bottling in August.

Buena Vista Carneros winemaking

Night hand-harvested grapes at 48°F to 54°F are placed on a cluster-sorting belt then de-stemmed. Berries are sorted on a second belt where jacks and material other than grapes (MOG) are removed.

Dry ice is added to the bottom of open-top tanks, which are loaded with whole berries and blanketed with CO_2 gas to begin a 5 to 8-day cold soak at 48°F. SO_2 is not added unless it's a problem block.

Tanks are heated to 60°F to 62°F to begin a 40% to 50% uninoculated fermentation, a decision made upon best blocks with best fruit intensity. Three punchdowns daily are done during active fermentation (reaching a max of

Continued on page 85

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Alleyway cover crops have little influence on Pinot Noir performance in Willamette Valley vineyards

BY Rebecca Sweet[1] and R. Paul Schreiner[2]
[1]Department of Horticulture,
Oregon State University and
[2]USDA-ARS-Horticultural Crops
Research Laboratory, Corvallis, OR

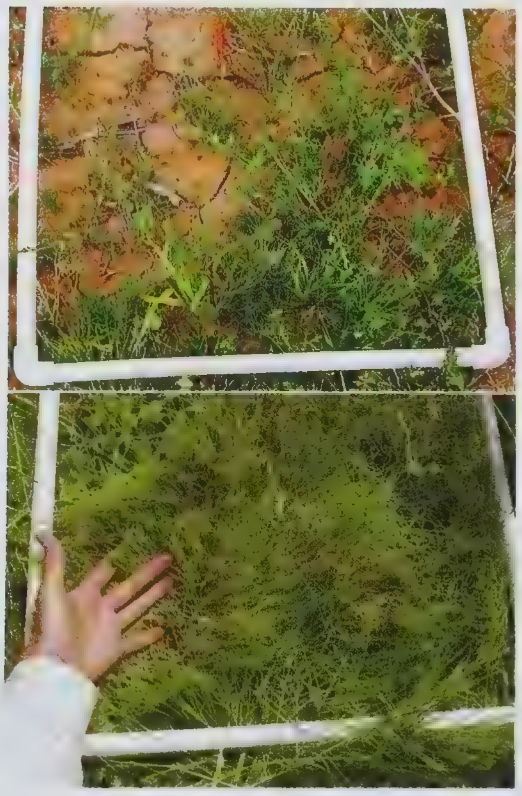
Many vineyard managers in western Oregon have increased tillage of vineyard alleyways (row middles) because of perceived competition between grapevines and cover crops for nutrients or water, which it is thought might lead to lower grape quality.

Competition between grapevines and alleyway cover crops was recently evaluated in a controlled experiment in two commercial vineyards in western Oregon. Seven cover crop treatments were applied at two vineyards in the northern Willamette Valley (designated **AS** and **JH**) in the fall of 2003. Cover crops were mowed according to the growers' preferences in the spring and summer, and the impact on vines was monitored in 2004 and 2005.

Pinot Noir grapevines (Pommard clone on 3309 rootstock) were grown at both sites (AS planted in 1994, and JH planted in 2001). Vineyard-AS was planted at a density of 5,123 vines per hectare on a moderately steep slope (15% to 30%) of Jory soil. Vineyard-JH was planted with 2,690 vines per hectare on a gentle slope (5% to 10%) of Yamhill soil.

Cover crop treatments applied at each site were:

- Winter Annuals (**WA** — oats, rye, and vetch),
- Clover Mix (**CM** — subclovers, clovers, and medic),
- Native Grass Mix (**NGM** — Willamette Valley upland prairie species),



Native grass mix in 2004 (top) and in 2005.

Winter annuals in 2004 (top) and in 2005.

Clover mix in 2004 (top) and in 2005.

- Native Meadow Mix (**NMM** — forbs plus grasses),
- Perennial Grass and Clover Mix (**PGCM** — sheep fescue, dwarf perennial rye, hard fescue, subclovers, clovers, and medic),
- Resident Vegetation (**RV**);
- Clean-Cultivated control (**CC**).

For a complete list of cover crop species used and seeding rates, see Table IV.

Each treatment was replicated four times at each site in a randomized complete block design. Treatments were applied to four adjacent alleyways affecting eight or ten vines in three vine rows, with one clean-cultivated border alleyway dividing blocks. Grapevines were not irrigated at either vineyard.

Cover crop establishment was measured by destructive sampling of biomass above 10 cm (mowing height) each time the vineyards were mowed according to the growers' practices. Weeds were sorted from cover crops, and both residues were dried and weighed. Weeds and cover crops from each plot were recombined to determine total nitrogen content.

Competition with grapevines was assessed by monitoring soil moisture, vine water status, vine nutrient status, vine root density in selected treatments, grape yield, and must quality. Data were analyzed by ANOVA and/or nonparametric tests, as appropriate. ANOVA was conducted using site, year (or sample date), and cover crop treatment as factors allowing for all interactions.

Site was designated as a random factor to allow for the widest possible application of our results to Willamette Valley vineyards. Variables that violated assumptions of variance were analyzed using the Kruskal-Wallis (K-W) nonparametric test.

Table I. Total alleyway biomass, proportion of biomass attributed to weeds, and total N content of six cover crop treatments at the first seasonal mowing date in two N. Willamette Valley vineyards over two years.

Treatment	Biomass (kg ha^{-1})	Percent biomass as weeds (%)	Total N content (kg ha^{-1})
WA	2444 a	6 d	37 ab
CM	2051 a	18 cd	66 a
NGM	737 b	69 ab	15 bc
NMM	498 b	58 abc	22 bc
PGCM	1272 ab	47 bc	40 ab
RV	566 b	100 a	5 c
significance level	<0.001	<0.001	<0.001

Values represent means (site and year combined). Means within a column followed by the same letter are not significantly different (Kruskal-Wallis @ 95% confidence).

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Table II. Effects of cover crop treatments on vine and soil parameters in two N. Willamette Valley vineyards over two years.

	Soil Moisture (% vol.)		Leaf water potential (MPa)	Leaf N (% dry mass)		Shoot Length (cm)	AS Only[1]
Treatment	Vine row	Alley		Bloom	Veraison		Prune weights (g)
CC	20.6	19.1 ab	–0.97	3.22	2.21 ab	97	913 a
WA	20.1	21.4 a	–1.03	3.09	2.06 b	87	770 a
CM	20.8	20.9 a	–1.04	3.31	2.26 a	90	961 a
NGM	21.1	20.4 ab	–0.96	3.14	2.07 b	96	752 a
NMM	20.7	20.2 ab	–1.03	3.20	2.12 ab	93	856 a
PGCM	19.4	18.7 b	–1.03	3.24	2.10 ab	89	750 a
RV	nd	nd	–1.03	3.21	2.12 ab	93	845 a
# sample dates	10	10	7	2	2	3	2
significance level	0.094	0.002	0.584	0.709	0.028	0.176	0.021
Test	K-W	K-W	K-W	ANOVA	ANOVA	ANOVA	ANOVA

[1] Prune weights were unavailable at JH in 2005.

Values represent means (site and year combined).

Means within a column followed by the same letter are not significantly different (Kruskal-Wallis or Tukey's @ 95% confidence).

Results

The WA and CM treatments both produced significantly more biomass than the NGM, NMM, and RV treatments, with the PGCM being intermediate between these cover crop treat-

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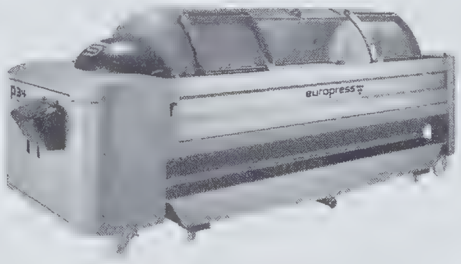

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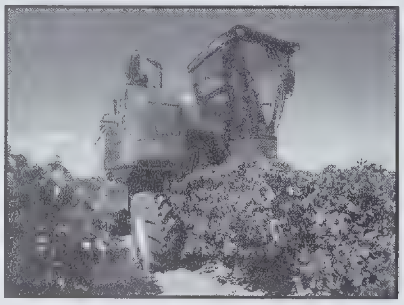

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Table III. Effects of cover crop treatments on yield and fruit quality of Pinot Noir in two N. Willamette Valley vineyards over two years. Values represent means.

						AS Only[1]
Treatment	Yield (kg)	Cluster mass (g)	Soluble solids (°brix)	pH	Titratable acidity (g L^{-1})	YANC (mg L^{-1})
CC	1.05	61	24.4	3.29	6.88	209
WA	1.02	57	24.4	3.32	6.48	202
CM	0.92	55	24.0	3.34	6.36	244
NGM	1.06	58	24.7	3.29	6.50	207
NMM	1.06	58	24.1	3.28	6.64	184
PGCM	1.09	59	24.4	3.24	6.64	167
RV	1.04	58	24.2	3.30	6.35	205
# sample dates	2	2	2	2	2	2
significance level	0.265	0.807	0.746	0.859	0.620	0.017
Test	ANOVA	ANOVA	K-W	K-W	K-W	ANOVA

[1] YANC was unavailable at JH in 2004.

ments (Table I). The WA, CM, and PGCM treatments significantly suppressed weeds as compared to the RV treatment, while the NGM and NMM did not.

The quantity of nitrogen contributed to the plots was highest in the WA, CM, and PGCM treatments. Site did not influence any of the cover crop establishment variables, but year

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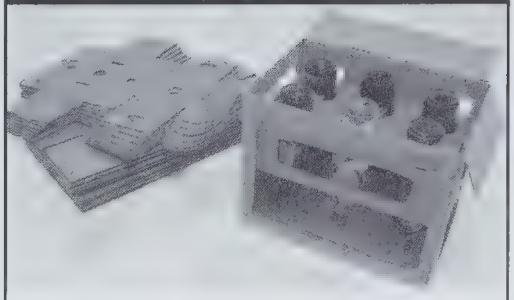

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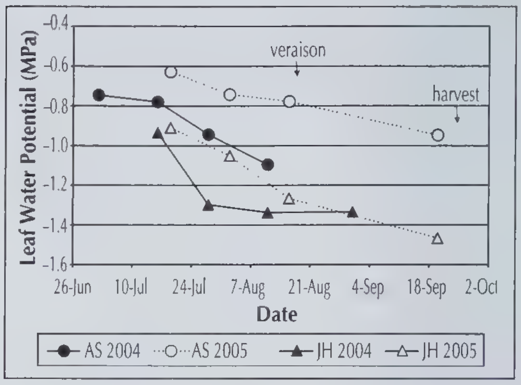

Figure I. Midday Leaf water potential in two N. Willamette Valley vineyards over two years (cover crop treatments combined).

affected the proportion of biomass as weeds — the quantity of weeds was lower in 2005 compared to 2004. Cover crop treatment was clearly the most important factor in dictating the amount of biomass produced and the total nitrogen contributed to plots, producing a wide range of biomass and nitrogen among the different cover crops.

Cover crop treatments, including the clean-cultivated control, had little effect on soil water content, vine water status, or vine vegetative growth (Table II). Soil moisture in the vine row was not influenced by cover crops, although soil moisture in the alleyway was slightly higher in the WA and CM treatments as compared to the PGCM treatment.

The clean-cultivated treatment was not different from any cover crop treatment at either location (vine row or alleyway). The largest driving force for soil moisture was sample date, with both sites declining over the season in both the vine row and alleyway (data not shown). Sample date was also the most important factor affecting vine water status.

Midday leaf water potential declined at both sites over the summer,

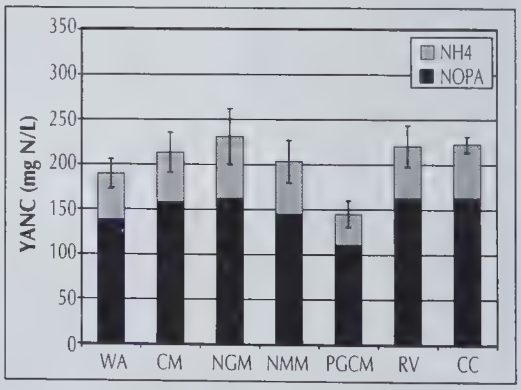

Figure II. Juice nitrogen at AS vineyard in 2004.

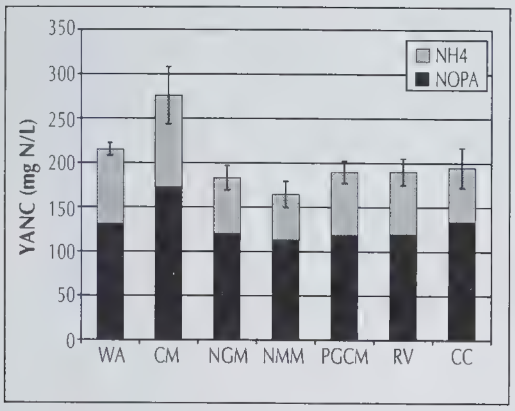

Figure III. Juice nitrogen at AS vineyard in 2006.

although Vineyard-JH developed greater water stress than Vineyard-AS in both years (Figure I) — vines at Vineyard-JH are much younger than vines at Vineyard-AS. Cover crop treatment had no effect on vine leaf water potential (Table II). Leaf nitrogen concentration was affected by cover crop treatment at veraison, but not at bloom. Early season shoot growth of vines and pruning weights collected after each season were unaffected by cover crop treatments (Table II).

Cover crop treatments had only a minor influence on the grapes (Table III). Yield, cluster weights, sugars, pH, and acids were not influenced by cover crop treatments in both vineyards. At Vineyard-AS, where two years of must nitrogen data was available, yeast assimilable nitrogen content (YANC) of the must was not affected by cover crop treatments in 2004 (Figure II), but YANC was greater in the CM treatment than in the NMM treatment in 2005 (Figure III).

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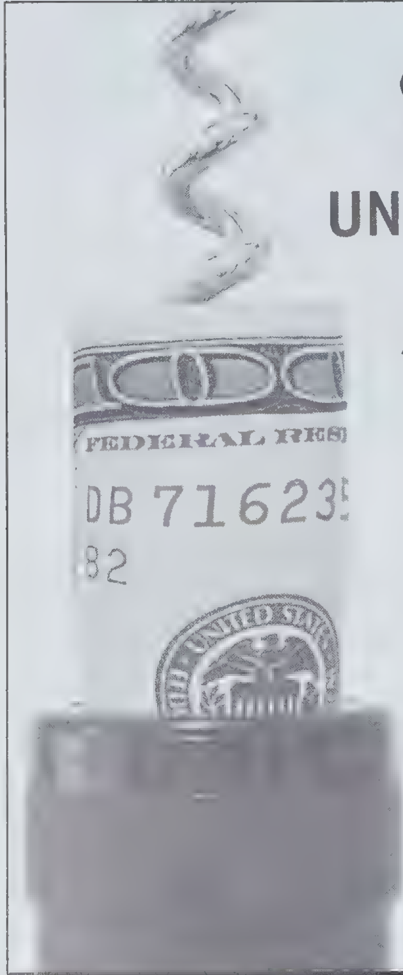

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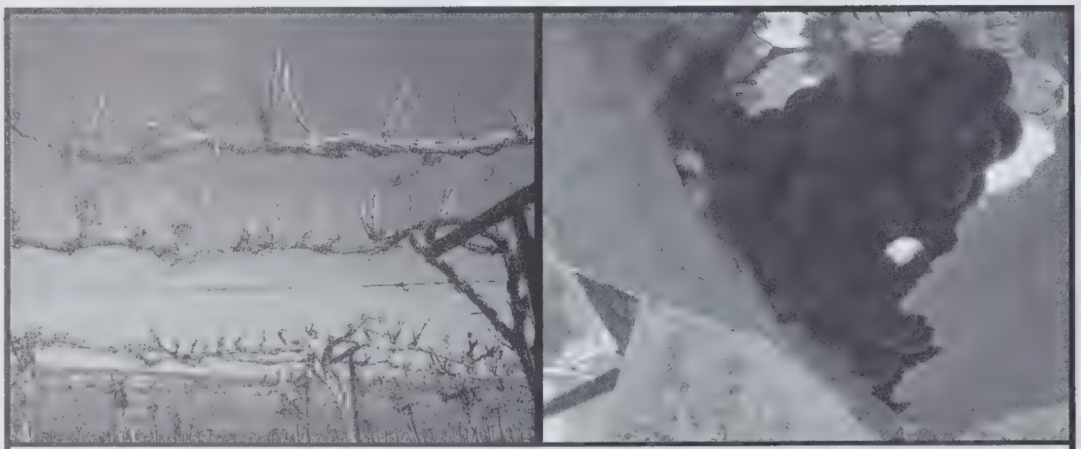

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Table IV. Cover crop treatments and seeding rates applied at two N. Willamette Valley vineyards, Sept. 2003

Treatment	Common Name	Seeding Rate (kg/ha)
WA	Cereal Rye	28
	Oat 'Monida'	28
	Common Vetch	28
CM	Hykon Rose Clover	4.2
	Mt. Barker Sub Clover	4.2
	Riverina Sub Clover	4.2
	Campeda Sub Clover	4.2
	Nitro Persian Clover	4.2
	Santiago Burr Medic	4.2
NGM	Prairie June grass	15.7
	California Oat grass	2.4
	Roemer's Fescue	13.5
	Blue Wild Rye	2.4
NMM	Common Yarrow	0.5
	Spring Gold	1.0
	Rose Checker Mallow	1.4
	Oregon Sunshine	1.0
	Self Heal	1.0
	Annual Lupine	1.4
	Tomcat Clover	1.4
	Showy Tarweed	1.4
	Purple Godetia	0.5
	Fairwell To Spring	0.5
	Large-Flowered Agoseris	1.4
	Common Gilia	1.0
	Spanish Clover	1.0
	Large Flowered Collomia	1.4
	Prairie June grass	3.5
	California Oat grass	0.5
	Roemer's Fescue	13.5
	Blue Wild Rye	0.5
PGCM	Dwarf Elf Rye grass	5.2
	Hard Fescue 'Ridu'	5.2
	Sheep Fescue 'Quatro'	5.2
	Hykon Rose Clover	1.1
	Mt. Barker Sub Clover	1.1
	Riverina Sub Clover	1.1
	Campeda Sub Clover	1.1
	Nitro Persian Clover	1.1
	Santiago Burr Medic	1.1

Conclusions

Winter annuals and clover mix produced large biomass and had the fewest weeds.

Native grasses established well in the second year.

Native meadow mix provided floral resources in both years but did not compete well with weeds.

Vine growth, yield, and water status were generally not affected by cover crop treatments.

Clover mix began to increase vine and juice nitrogen in the second year, possibly at the expense of yield.

Alleyway cover crops managed by mowing do not compete with vines under typical weather conditions in western Oregon.

Impact on Industry

Cover crops had little measurable influence on the growth and fruit quality of Pinot Noir grapevines at two Willamette Valley vineyards with different soils, different vine densities, and different-age vines. This two-year study, conducted under fairly normal rainfall and temperature patterns for the region, showed little competition between cover crops and vines for water or nutrients.

Since a clean-cultivated control was used in this study, it can be concluded that use of alleyway cover crops will not interfere with growth or nutrient and water uptake of established Pinot Noir grapevines when cover crops are mowed in the spring and summer. Therefore, the advantages of using cover crops (like protecting soil from erosion, adding organic matter to soil, and providing plant diversity in the vineyard) may be more important considerations than the potential disadvantage of competition with vines when growers evaluate the use of cover crops in western Oregon vineyards.

The long-term affect of certain cover crops, including the clover mix used, could result in the supply of too much nitrogen to vines under Oregon conditions, and this aspect should be further examined. ■

Acknowledgments

We kindly thank Leigh Bartholomew and Stirling Fox for participating in this study. Funding was provided, in part, from the Northwest Center for Small Fruits Research.

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RECENT RESEARCH

Covering the vineyard floor

BY Bibiana Guerra

Below are reports on articles that have studied the use of cover crops in vineyards. Two of them compare the impact of their presence or absence, full or partial, on soil properties and vine growth. In the third article, the authors look, in detail, at the merits of cover crops in the vineyard floor, and the fluctuations in organic matter produced. The last two articles compare the suitability of different cover crop species, and two different ways of managing a cover crop. The original titles of the papers are retained in the article below, and are referenced at the end of this article.

Grapevine root system and soil characteristics in a vineyard maintained long-term with or without interrow sward[1]

In their trial site, nestled in the Loire Valley of France, R. Morlat and A. Jacquet compared the merits of 1) leaving the vineyard floor bare with the use of herbicide; 2) growing a cover crop in the middles, or interrows; and 3) growing a cover crop in alternating middles. Their goal was to track the effects of these three types of floor cover on soil properties and vine growth characteristics. To make sure they had enough opportunity to capture any results, they studied the trial site for 17 years.

The authors started analyzing what the presence or absence of a cover crop did to the soil. They found that organic matter, nitrogen, C/N ratio, pH, exchangeable potassium, and moisture at field capacity were all significantly higher in the areas with cover crops. Bulk density and soil strength, on the other hand, were significantly lower. This means that cover crops were making the soil more porous (with less density) and more loose (with less strength) — both clearly desirable. The cover crop was a tall fescue (*Festuca arundinacea*), and the soil was a loamy clay, rather deep (0.8 to 1 m [2.6 to 3.3 ft.]), and with abundant water (185 mm [7 inches] in the first three feet).

The authors then looked at whether the cover crops had caused any changes in vine root distribution, which indeed they had. In the presence of a cover crop, fine roots tended to concentrate around the vine trunk. In the absence of a cover crop — the "herbicide" and the "alternate cover crop" treatments — fine roots concentrated more in the middles.

What about larger roots? Larger roots were able to reach further out in the areas treated with herbicide than in the areas containing a cover crop. In other words, the authors found competition between vine roots and grass roots, and concluded that the presence of the grass was inhibiting the growth of vine roots in the upper soil horizon.

But the vine roots were not the only vine parts affected by the presence of a cover crop. The authors could also document a reduction in: pruning weights, lateral shoots, yield, and botrytis infection. Canopy temperature and sun exposure were also improved with the cover crop treatment. Sugar, anthocyanin, and tannin contents were all higher (better grape composition) with the presence of a cover crop. The authors interpret this reduction in aboveground biomass as an adaptation mechanism of the vines to a reduced water and nutrient supply in the presence of a cover crop.

Herbicide treatment inter-row (HTI, foreground) alternates with sward treatment inter-row (STI, background). Several inter-rows are maintained with permanent sward (*festuca arundinacea cv. manade*) over 50% of the total soil surface.

Pit with a vertical profile of soil for root-counting, 0.15m from the vine row. The pit was dug in an inter-row with herbicide control (HTI treatment), alternating with an adjacent inter-row with sward (STI treatment, background).

Influence of vineyard floor management practices on grapevine vegetative growth, yield, and fruit composition[2]

Three Australian authors, D. Tesic, M. Keller, R. Hutton, did essentially the same as Morlat and Jacquet — they compared bare soil, a partial cover, and a complete cover — but added the variable "in a dry versus in a humid vineyard." Thus, they evaluated the influence of a vineyard's **climatic location** on the suitability of cover crops for the vineyard floor.

They found that, along with the beneficial effects of cover crops — mainly better canopy openness — there were also some detrimental effects. These "less glamorous" aspects of cover crops included higher depletion of soil moisture, reduced petiole nitrogen and potassium, delay of the onset of veraison, reduced shoot length (and as a result, pruning weights), and reduced yields. These negative factors were often emphasized in a "dry vineyard" situation.

For example, shoots grew faster in bare soil in the dry vineyard, but the cover crop had no effect on shoot growth rate in the humid vineyard. Similarly, Brix was lower in grapes subject to the bare treatment in the dry vineyard, but bare soil did not affect Brix in the humid vineyard.

The authors conclude that the effects of the presence of a cover crop are site-dependent, and are particularly striking for Chardonnay vines grown under full cover in a warm, dry area. Still, they believe some of the benefits of cover crops may be captured in this type of arid climate if we are able to compensate at other levels.

Their recommendations include choosing low-growth species, keeping the cover well-mowed, using mulches to conserve moisture, using drought-tolerant rootstocks, and initiating irrigation early in the season, all of which would help compensate for the overall depressing effects of cover crops on yield.

Cover crop management in a Chardonnay / 99 Richter vineyard in a coastal wine grape region, South Africa

Part I. Effect of two management practices on selected grass and broadleaf species[4]

Part II. Effect of different cover crops and cover crop management practices on grapevine performance[5]

In these two articles, which capture a Ph.D. dissertation at the University of Stellenbosch, South Africa, J. Fourie, P. Louw, and G. Agenbag compare the suitability of eight different species of cover crops, including grasses, legumes, and broadleaf species. At the same time, they also compare two ways of managing a cover crop: chemical elimination right before vine bud-break compared to chemical elimination at the end of the growing season.

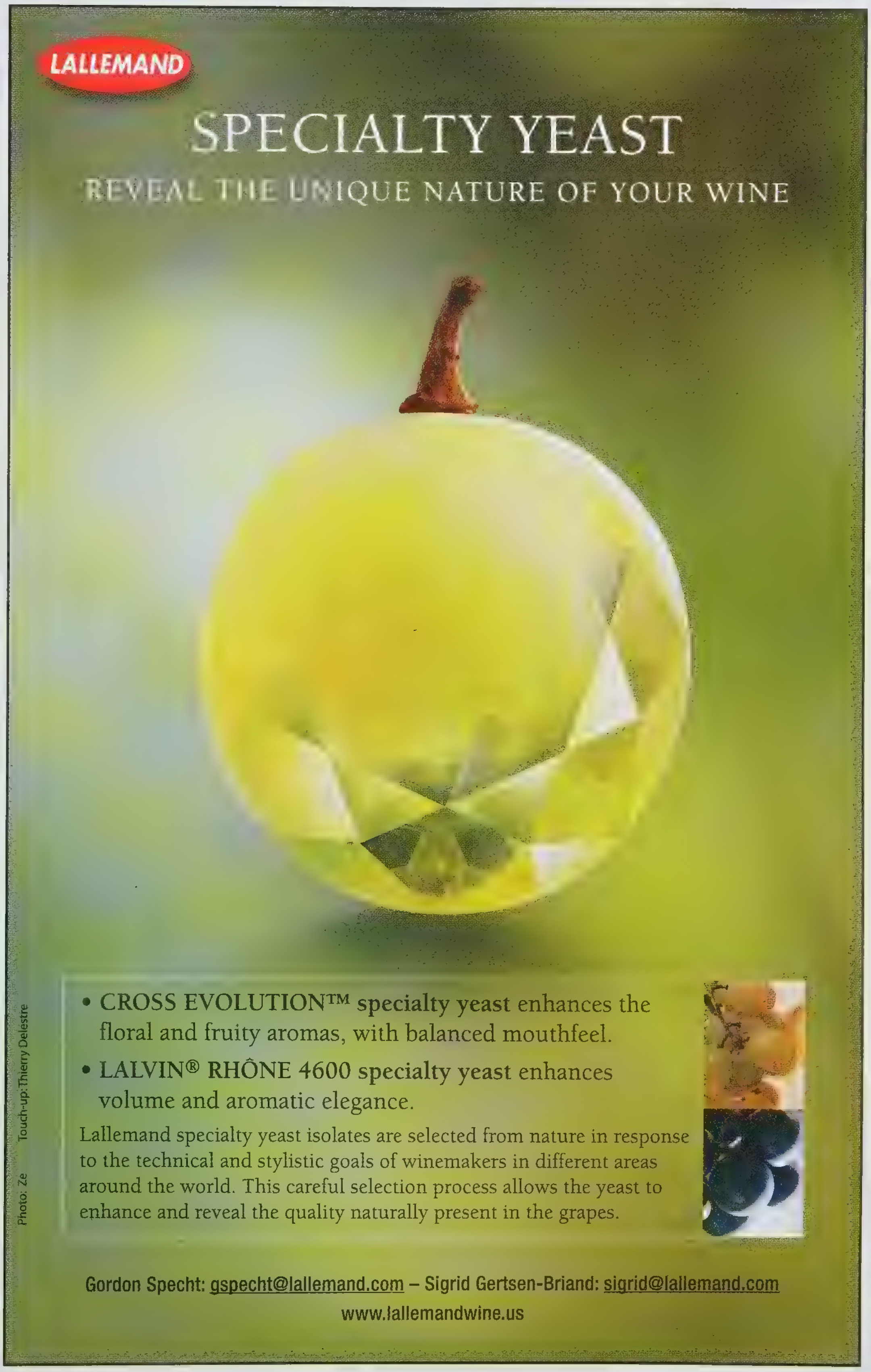
The goal of their research was to find the most effective cover crop species/management combination to control weeds in a coastal vineyard floor situation.

The research site had the typical medium-textured soil found in the coastal grapegrowing region of western South Africa (70% sand, 13% silt, 17% clay). The cover crops were sown in April. The vineyard was irrigated by sprinklers for the first 10 weeks, and then relied on rainfall. Rainfall at the site typically ranged from 400 to 600 mm (16 to 24 inches per year).

The authors were able to obtain the best control of **winter weeds** with the two oat species (*Avena sativa* and *Avena strigosa*), in combination with chemical control at bud-break. The two medics (*Medicago truncatula* and *Medicago scutellata*) and grazing vetch (*Vicia dasycarpa*) also worked well for the first three seasons, but failed in later years.

As for **summer weed** control, the authors achieved the best results with the grasses, be they rye (*Secale cereale*) or oats (*Avena*), in combination, once again, with chemical control at bud-break. Control of summer weeds with a cover crop of broadleaf species, on the other hand, was erratic or only effective the first year.

The authors emphasize the importance of not delaying the chemical control of the grass cover crop



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beyond bud-break, as this gives weeds an opportunity to reseed and start building up. On the other hand, since none of the species tested was able to re-establish consistently, the authors recommend resowing the cover crop annually.

Early chemical control of the cover crop, rather than at the end of its life cycle, also ensured the highest shoot growth and the highest yields (less competition). When the authors looked at the petiole nutrient status, both the control vines (no cover crop) and the vines with cover crop controlled at the end of the season showed a slight nitrogen under-supply.

In contrast, the use of some legumes, coupled with an early chemical control, resulted in higher petiole nitrogen, and even some degree of over-supply. In agreement, juice nitrogen in the fruit from this latter treatment also indicated nitrogen over-supply. For this reason, the authors warn against the sustained use of cover crops consisting solely of legumes, due to the risk of early-season nitrogen over-supply, and resulting excessive vigor.

Based on their experience, the authors are able to make the following recommendations:

1. Even though cereals, particularly oats, were most effective in controlling both summer and winter weeds, it is best to rotate them with other cover crops after the fourth year, to avoid a drop in effectiveness.

2. Annual sowing of legumes, in combination with post-emergence chemical control, turned out to be the best management practice in **young vine** situations (new plantings).

3. As the vines became mature, introducing cereals in the legume rotation at least every fourth year proved to be the best management practice in this study to avoid weeds, without risking an nitrogen over-supply.

Managing vineyard soil organic matter with cover crops[3]

What are the actual benefits of cover crops? In their research, Glenn McGourty and John Reganold explain how cover crops are the way to reverse the trends of reduced fertility, lower buffering capacity, and reduced biological activity that are the unavoidable result of soil cultivation.

By growing a cover crop, soil macropores and aggregates are created. Macropores and aggregates, in turn, improve infiltration, water storage, and gas exchange.

First, the authors classify cover crops into three main practical groups: 1) grasses, including cereals; 2) legumes; and 3) forbs, or broad-leafed plants.

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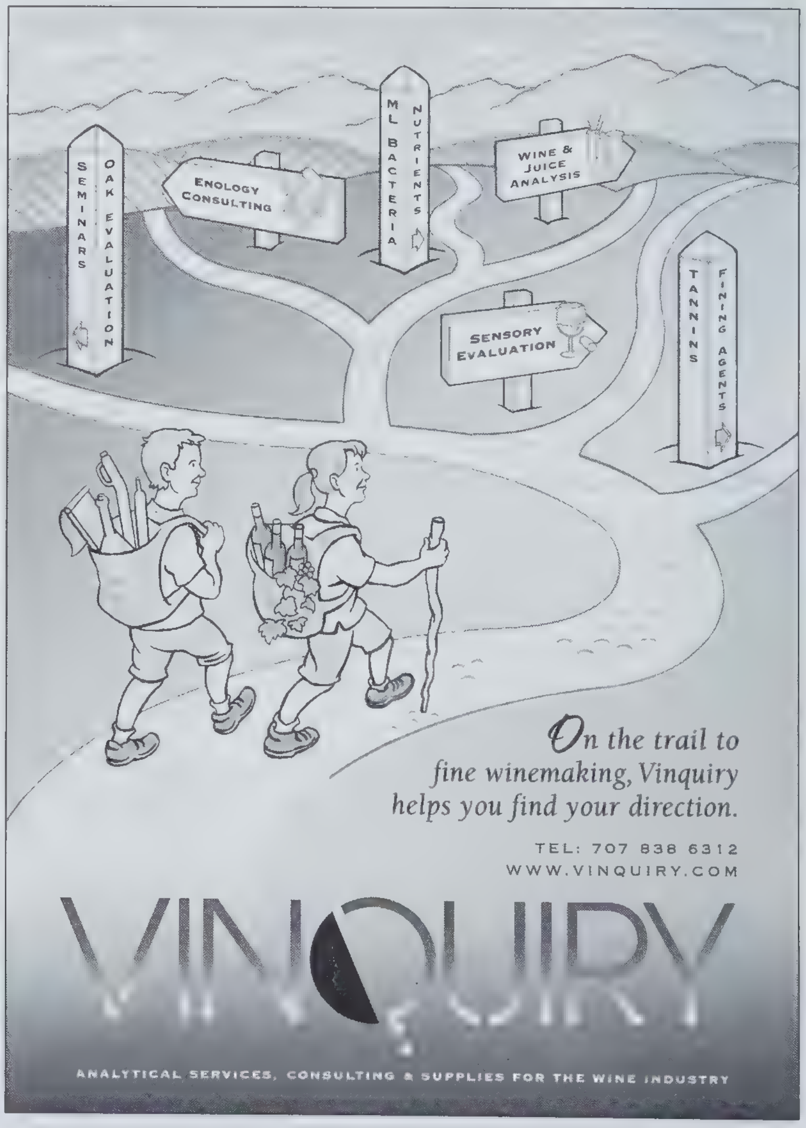

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Legumes decompose rapidly (since they have low C/N ratios) and contribute little organic matter, but they are able to fix enough nitrogen to meet the vines' annual needs.

The interest in broad-leafed cover crops (mustards, composites, buckwheat) varies greatly depending on the species, but three common uses are to prevent nitrogen leaching, to create insectaries, and to suppress nematodes.

The authors divide the benefits of cover crops into three categories: 1) improved soil physical properties (less erosion, less crusting, less runoff, preserved moisture); 2) increased soil biological activity (roots exude compounds that attract microorganisms); and 3) improved soil composition, particularly increased organic matter.

The list of benefits that organic matter (OM) brings to the vineyard floor is quite long: improved structure, increased porosity, lower bulk density and soil strength, increased nutrients (mainly nitrogen, sulfur, and phosphorus), increased mobilization of micronutrients, increased cation exchange and water-holding capacity, and, in some cases, reduced pathogen presence.

The authors offer the following tips when trying to build soil organic matter: 1) OM accumulation is highest in cool, humid regions, so a sunny, dry climate is going to make OM accumulation more challenging; 2) fine- and medium-textured soils accumulate OM faster than coarse-textured soils; 3) accumulation is more difficult if soils are tilled, which is why conservation tillage removes less OM and decreases erosion; 4) grasses and sod-forming cover crops are the most effective in building OM because their residue is high in carbon; and 5) mixing grasses and legumes in cover crops will ensure a good rate of decomposition — not too slow, not too fast.

In the authors' experience, it takes five years of a soil-building program (compost + cover crops) before OM begins to make any noticeable difference. But in their opinion, the wait is well worth it, and besides, other benefits of cover crops — such as erosion protection, nitrogen increase, vine devigoration, and weed suppression — can be enjoyed much sooner. ■

End Notes

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2. D. Tesic, M. Keller, R. Hutton. 2007. *Am. J. Enol. & Vitic.* 58(1): 1–11.
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VINEYARD FLOOR MANAGEMENT

Evaluation of the impact of in-row practices on soil/water erosion, vine growth and productivity, weed control, economics of wine grape production

BY L. Bettiga,[1] R. Smith, M. Cahn, and L. Tourte,
[1]University of California Extension Farm Advisor, Salinas, CA

Alternative vineyard floor management practices have been investigated by Larry Bettiga, et al. One large-scale and two small-plot experiments were established in Soledad, CA (Monterey County) in the winter of 2005 to evaluate the effects of in-row barley cover cropping (see photos).

The large-scale (3.5 acres) experiment evaluated three in-row management practices: standard, pre-emergent herbicide using flumioxazin (Chateau) at 0.38 lbs a.i. per acre + 2% glyphosate, with follow-up post-emergence applications of 2% glyphosate applied as needed in summer to control weeds; standard + polyacrylamide applied in a band under the vine row at 3 lbs per acre prior to rain events with the same weed control described above; and in-row cover crop treatment using barley that was allowed to develop to 12 inches and then burned back with a 2% glyphosate application.

Two small-plot experiments were established to evaluate the influence of the timing of burn-back herbicide sprays to in-row covers, and also to evaluate the effects of plant type on in-row cropping.

To examine the effects of burn-back timing of in-row cover cropping, one of the small plots was treated with four methods: standard, post-emergent herbicide 2% glyphosate with follow-up post-emergence applications of 2% glyphosate applied as needed in the summer to control weeds; and three in-row cover crops using barley that were allowed to develop to 6, 12, and 18 inches and then burned back with a 2% glyphosate application.

To evaluate the effects of different plant types on in-row cropping, a second small plot was established as a third experiment. The site was planted with barley, subterranean clover (cv. Trikkala), and mustard (cv. Ida Gold). These covers were planted in the vine row and were sprayed with 2% glyphosate (prior to bud-break).

For all three experiments, data was taken on weed impacts, runoff, soil water, soil and plant nutrition, grapevine growth and productivity, and the economics of each treatment method.

Weed Pressure — In the first experiment, data on weed pressure was examined in late April, and because weed pressure was light, the authors did not conduct further experiments. However, weed control proved to be problematic later in the season, perhaps due to late spring rains and the lack of pre-emergent herbicide use.

In the second experiment, even the crop that was burned back at the earliest stages of development (after six inches of growth) provided significant ground cover into April, which suggests that burn-back on young plants does not drastically affect their ability to cover the soil and stop weed growth. By June, all cover treatments had significant weed growth, but the cover crop that was sprayed at 18 inches, had the least.

Runoff — Runoff data was collected from soil berms, which transmitted runoff into a five-gallon bucket at

Barley in-row cover after a burn-down glyphosate application. (Photo by Larry Bettiga)

Barley in-row cover. Grower standard treatment on left. (Photo by Larry Bettiga)

Mustard in-row. (Photo by Larry Bettiga)

the lower end of the site. A bilge pump, float switch, and residential flow meter were used to measure the runoff that was collected in a sump during rainstorms.

Rainfall was monitored through a tipping bucket sensor and a data logger. Samples were collected within 24 hours of a storm and were then analyzed for nitrate and ammonium; the rest of the sample was tested for nutrients (including total P, ortho-P, and total nitrogen), total dissolved salts, and sediments (total suspended solids and turbidity).

Between February 1 and April 12, 2006, total precipitation was 7.58 inches. One storm in late February resulted in 1.6 inches of rainfall; all other rain events were less than 0.5 inches. Runoff averaged 0.07 inches — less than 1% of the total rainfall — and no significant difference was found in runoff from each of the plots.

Runoff samples collected on April 6 were the only ones tested for nutrients and sediments; in this case, both concentrations of nutrients and turbidity were low, and no significant differences were found in the data from different plots. The authors concluded that the low amounts of nutrients and turbidity were the result of the small amount of runoff that was collected for that date.

Soil Moisture — Soil water (including storage and usage), was evaluated through neutron probe readings installed in the vine rows. In the first experiment, soil moisture

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was significantly lower in the summer months due to an increase in weeds, and the lowest soil moisture occurred in the area with an in-row cover crop.

In the second experiment, the area with the 18-inch burn-back had the lowest moisture depletion. The authors concluded that lower soil moisture levels in the no-cover and early burn-back plots were due to the greater amount of weeds that developed.

In the third experiment, the plots planted with subterranean clover and mustard experienced lower moisture levels.

Grapevine Productivity — Data regarding grapevine productivity was taken through collection of the pruning weight of the vines and measuring the diameter of the developing vines. In the first experiment, the use of in-row covers did not have a negative effect on vine growth or development. This seems to be due to

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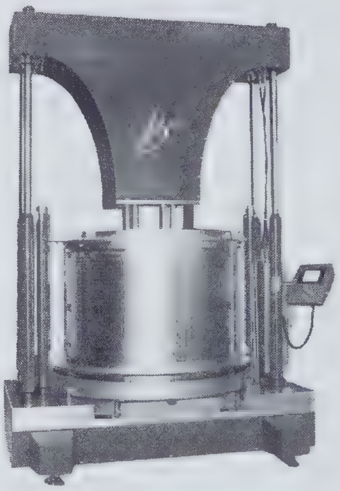

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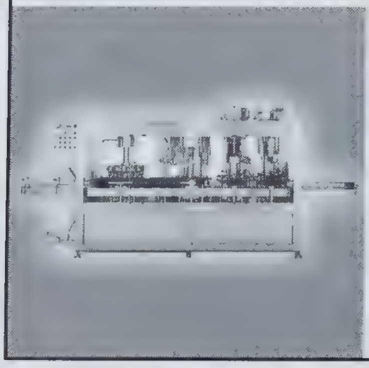

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heavy spring rainfall and the fact that the cover crop was sprayed a month before bud-break, so that it did not directly compete with the vines' growth period.

Grapevine growth data produced an interesting result: the use of polyacrylamide created an increase in trunk diameter and the first cordon internodes.

In the second experiment, no correlation was found between in-row cover burn-back, standard burn-back practices, or lack of cover, and vine growth. Similarly, in the third experiment, the use of different cover crops did not influence vine growth.

Plant Nutrition — Plant nutrition was evaluated by collecting petioles and leaf tissue from all three experiments and then analyzing the samples for NO_3, NH_4, N, P, K, S, Ca, Mg, B, Zn, Mn, Fe, and Cu. To evaluate soil nutrition, soil samples were also collected and analyzed for pH, OM, CEC, NO_3, P, K, Ca, Mg, Na, Cl, B, and Zn. Results of these tissue samples — and results on the economics of different in-row cover crop practices — will be available in an interim report, to be published late in 2007.

Conclusion

Although the authors stated that continuation of this project is needed to thoroughly evaluate long-term effects of in-row cover cropping on soil nutrition and the economics of various in-row cover practices, it is clear from this initial research that an in-row cover crop does not adversely affect vine growth. ■

This project was funded by the American Vineyard Foundation.

This article was authored by Amanda Roberts.

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VINEYARD FLOOR MANAGEMENT

Evaluation of long-term impact on crop production and quality, weed control, soil and water parameters, and economics of winegrape production

BY L. Bettiga,[1] R. F. Smith, M. Cahn and L. Tourte,
[1] University of California Extension Farm Advisor, Salinas, CA

Evaluation of the long-term effects of various vine row weed control strategies was conducted by Larry Bettiga, et al. A five-year study compared three weed control practices: the standard method (using pre-emergent herbicide with follow-up post-emergent applications), all post-emergent herbicide, and all cultivation with three vineyard middle treatments, (bare soil, Merced rye, and Trios 102).

The study, which was established on a seven-acre plot in Greenfield, Monterey County in the winter of 2001, contained relatively uniform Elder Loam soil with a gravelly substratum. From 2001 to 2005, three plots were treated with one of the three forms of weed control.

On the first plot, standard practice for the Central Coast — simazine (1.8 lbs a.i. per acre) + oxyfluorfen (1.0 lbs a.i. per acre) — was applied in winter, with as-needed follow-up post-emergence summer applications of 2% glyphosate + 1% oxyfluorfen. Applications were made with a Patchen light-activated sprayer.

On the second plot, a Radius Weeder was used as needed, (approximately four to six times), throughout the spring and summer.

The third plot was treated with a post-emergent application of 2% glyphosate + 1% oxyfluorfen, which was applied with a Patchen sprayer.

Each of the three plots was also treated with three different crops: bare (no cover crop), Merced Rye, and Trios 102.

To investigate the overall effects of the various weed control practices (and to analyze the effects of the three forms of cover crops), data was taken to quantify the weed impacts, soil water, soil physical properties, soil and plant nutrition, grape yield and quality, runoff, and economics of these experimental crops.

Weed Frequency

Weed frequency was measured by counting how often a weed was found along a 100-point transect that was converted into a percentage that reflects the rate of weed recurrence.

The percentage of weed frequency proves that distinct weed communities emerged in each of the three treatments, and in each case, these weeds appeared to take advantage of the weaknesses of the various forms of weed control.

The cultivation-treatment plot experienced the most weed growth, with purslane (*Portulaca oleracea*) and shepherd's purse (*Capsella bursa-pastoris*) proving to be the dominant weeds. At the experiment's initiation, levels of these weeds were low; however, over the experiment's five years, their numbers increased drastically, and they became the dominant winter and summer weeds in this plot.

In the post-emergence-treatment plot, frequency of horseweed

Merced rye cover in vineyard floor trial #1. (Photo by Larry Bettiga)

(*Conyza canadensis*) increased in 2003. This was due to cultivation being discontinued in this plot, and to use of the post-emergent mix of glyphosate and oxyfluorfen in 2001 and 2002, which has little effect on this weed. To bring horseweed under control, glufosinate was applied in seasons 2003–2005; in 2004 and 2005, the weed's population was stabilized, but it remained the predominant weed.

In all years except 2004, nutsedge (*Cyperus esculentus*) was the abundant weed in the pre-emergence plot. While post-emergent applications of glyphosate partially stabilized the weed's population, it was never completely controlled.

The authors concluded that the lower levels of weeds in the pre- and post-emergence plots proved that these weed controls had an obvious advantage over the cultivation plot. However, specific weeds seemed to take advantage of the weaknesses in each system of weed prevention, proving that all forms of weed control have their disadvantages.

Runoff

Runoff was determined by channeling water into a 16-inch diameter cylinder. An automatic recording device that measures runoff volume with a recording flow meter calculated the amount of water that was collected.

In three consecutive years, runoff was reduced in plots with cover crops. In addition, cover crops helped to reduce sediment and nutrient loss.

Soil Water

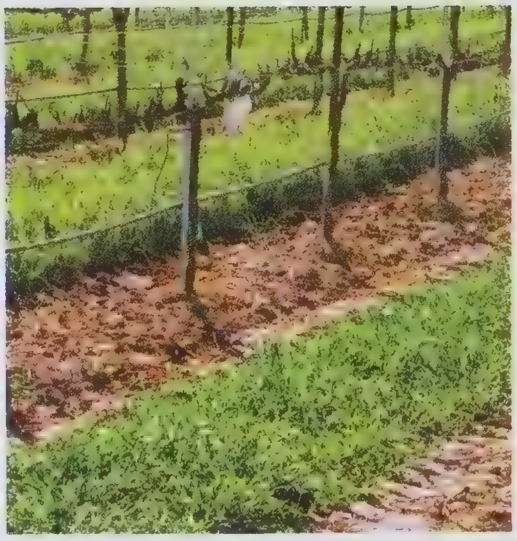
To measure soil water, access tubes were installed 4.5 feet deep at the vine row berms and adjacent row middles. Neutron probe readings were taken weekly at one-foot-deep intervals.

Soil moisture declined steadily throughout the season, but the rye crop diminished soil moisture levels quicker overall than the bare or Trios crops, presumably due to rye's need for more water. The Trios cover resulted in the biggest overall decline in soil moisture levels within the vine rows (years 2003 and 2004).

Soil Compaction

Soil compaction was measured with a Field Scout soil compaction meter SC-900. Ten sites were chosen along each plot, (probed 15 inches deep), and samples were taken late in 2003–2005. Water-stable aggregates were measured at the same time.

Greater soil compaction was recorded in the cultivation-treatment plot in years 2004 and 2005, yet it had no effect on grape yields or quality. The authors believe that the differences in soil compaction are due to the cultivator that was used in the cultivation treatment. Compaction levels were greater at a depth of 4 to 8 inches, which is the same depth at which the cultivator passes through the soil.



Merced rye on left, Trios on right; note the slower development of the Trios cover crop. (Photo by Richard Smith)

The authors expected to see a difference between water-stable aggregates, but none were observed. They hypothesized that because the vineyard was harvested in years prior to the trial, enough time was not allotted for differences to develop. They

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also noted that the differences in water-stable aggregates might be so small to not be detectable with the equipment used.

Soil and Plant Nutrition

Soil and plant nutrition were measured by collecting 100 whole leaves from every plot, removing the petioles, and drying the tissues. Fifteen soil samples were also collected from the vine rows and the adjacent middle-row treatments of each plot.

In the middle rows, a pick was used to loosen the soil that was then collected with a trowel. Soil collections were dried for two weeks and then both soil and tissue samples were sent to the University of California DANR Analytical Laboratory for analysis. Petioles and leaf tissue were tested for NO_3, NH_4, N, P, K, S, Ca, Mg, B, Zn, Mn, Fe, and Cu. Soil samples were tested for pH, OM, CEC, NO_3, P, K, Ca, Mg, Na, Cl, B, and Zn.

Tissue analyses proved that leaf and petiole nutrient levels were not affected by the weed treatments in years 2004 and 2005. Cover crops seemed to have a slight impact on the crop's nutrition in 2005. Boron, phosphate, and total phosphorus were higher in the leaf tissue. In 2003, the ammonium level was higher in the petioles. In 2005, zinc levels in the petioles were lower.

Soil analyses proved that, throughout the years, weed treatments slightly impacted soil nutrient levels. In the cultivation-treatment plot, nitrate-N was lower for vine rows in 2005, zinc was lower in years 2003 and 2005, and potassium was lower in 2004, but higher in 2003. In the row middles, chloride was lower in the standard weed treatment, while sodium, magnesium, and calcium were higher when next to the cultivation treatment.

Cover crops had significant impacts on nutrients in the soil. These soils had lower levels of nitrate and phosphorus, and both had consistently higher organic matter levels than the bare treatment.

While cover crop treatments had little impact on soil nutrients in adjacent vine rows, they highly impacted row middles. In 2005, zinc was lower in the vine row adjacent to the bare row middle treatment. In 2003, phosphorus and potassium were higher in the bare treatment, while the cation exchange capacity was higher in the vine row adjacent to the Trios plot.

The largest impacts on soil nutrient levels occurred in the cover crop treatment in the row middles. In 2003, nitrate, sodium, and boron were higher in the bare treatment and chloride, phosphorus, and organic matter were lower. In 2004, organic matter was lower in the bare treatment, yet sodium and nitrate were higher. In 2005, organic matter, chloride, and zinc were lower in the bare treatment row middles; yet phosphorus, sodium, boron, and pH were higher.

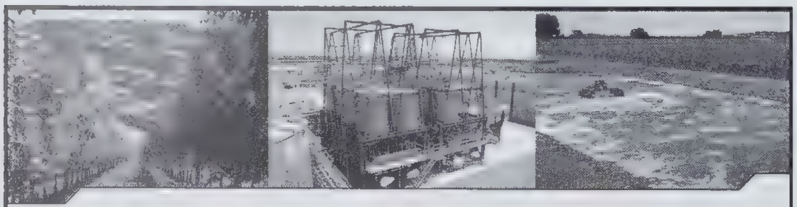
Throughout the experiment, the soil in row middles showed interesting trends. With the bare treatment, nitrate, phosphorus, and sodium were highest, while organic matter levels were consistently higher in cover crop treatments than in the bare treatment.

The authors concluded that the healthier soil in the cover crop plots proves the advantage of maintaining a cover crop rather than bare soil in vineyards.

Grape Yield and Quality

To measure grape yield and quality, 20 vines were taken from each plot and the number of clusters per vine and the weight of the grapes were recorded. Before harvest, a 200-berry sample was collected and tested for soluble solids, pH, and titratable acidity. Shoot counts and pruning weights per vine were collected during vine dormancy.

In 2001 and 2004, the berry size was reduced in the Trios plots; however,



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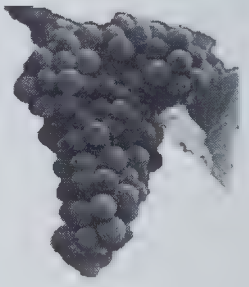

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crop yield and quality were not affected by different weed control treatments.

In 2001 and 2005, the Trios plots produced much smaller pruning weights, which may be related to the decline in soil moisture that was observed in the Trios-treated area. When averaged over the experiment's five years, the smaller pruning weights of the Trios treatment did not have a significant impact on grape yield or quality. The numbers from these two years suggest that vine growth, yield, and grape quality are possibly related to irrigation practices, but in general, irrigation can overcome the impact of diminished water levels due to the presence of cover crops.

Economics

To estimate the economics of the project and the costs of weed control and different cover crop methods, the time/labor and materials used in each weeding technique were recorded.

Economic analyses proved that post and pre-emergence treatments were the most inexpensive weed control methods, but these costs are contingent upon rainfall and weed pressure. In general, more rainfall resulted in higher weed pressure, which called for an increase in herbicide treatments, and increased the cost of the individual plot.

With the cultivation treatment, weeds were a major problem, and the need for numerous post-emergent herbicide applications resulted in incredibly high costs for this experiment.

The initial planting of rye and Trios increased production costs, but the authors urge growers to consider this to generally be a one-time cost; most cover crops can be grown to reseed the following year, which cuts reseeding costs for the next season.

The authors also urge growers to consider the one-time planting fees as an "investment." With the numerous advantages to growing a cover crop, including an increase in soil nutrients and a decrease in erosion, the costs of planting a cover crop seem justifiable.

Conclusion

Although the weed-control treatments did not impact crop nutrition, they did affect soil nutrition and runoff, which suggests that the long-term advantages to planting cover crops are not the effects on vine growth, but the positive effects on other aspects of field management. ■

This project was funded by the American Vineyard Foundation.

Author of this research-summary is Amanda Roberts.

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Albariño, that's what is new!

BY Dr. Richard Smart

Many friends are irritated by my greeting "What's new?" When I recently put this question to my friend Scott Williams, vineyard manager of Pacific Vineyards (San Luis Obispo, CA), he replied, "Tangent Albariño!"

Who or what is Albariño?

Albariño is a white variety from Northern Spain (Galicia) and Portugal. The Portuguese name is Alvarinho, which I prefer and will use here. Paragon Vineyards' "tangent" brand is marketing the Spanish Albariño. Spain's Galicia region is wet and cool, and the variety has a well-known tolerance for wet weather near harvest.

Alvarinho makes a delicate but scented wine, similar to Riesling, but with a richer aroma and fuller palate. In fact, I've heard that Alvarinho may be distantly related to Germany's Riesling.

I am told by Spanish friends that Alvarinho is Spain's best white variety. It is certainly witnessing a resurgence of popularity there. Interestingly, in the United Kingdom's wine market, it has earned a cult following.

The New World has been very slow to catch on to this variety, however, and I know of only a few producers in Australia and now California. Tamar Ridge Estate in Tasmania is my principal client, and at my prompting, Tamar Ridge produced its first Alvarinho this year. The wine is stunning.

Albariño clusters at the Jack Ranch, Edna Valley, San Luis Obispo, CA.

Because it's from the cool north of Spain, I imagined that this variety would be best suited to cooler regions elsewhere as well. Based on our Tasmanian experience, that is likely true. However, some varieties (like Chardonnay) can make commercially useful wines over a very wide range of temperature conditions, although Riesling makes poor quality wines in warm to hot regions.

I expected that Alvarinho might also do poorly in hot climates. Recent evidence causes me to rethink this hypothesis, however.

I have a grapegrowing client west of Barcelona in a region so hot that they have the earliest harvest (of Chardonnay) in all of Europe. They produce a very nice Alvarinho also! As a result, I was not totally surprised when I came across another good quality Alvarinho grown in a hot climate, this time in Renmark in Australia's Riverland, a climate as hot as the mid-Central Valley in California.

The variety excites me. It would appear from these limited instances that Alvarinho can maintain its varietal characteristics over a broad climate range. Further, the name is easy to say, and quite easy to spell, so that it could become the darling of wine writers (they like easy-to-spell varieties…). We may have another variety here that could really catch on around the world.

Albariño in Edna Valley

Alvarinho or Albariño seems to be the new darling of Paragon Vineyards. Located in Edna Valley, CA, Paragon is home of the tangent wine brand and is managed by Williams and Pacific Vineyards. Paragon plans to have planted 50 acres of Albariño by the end of 2007. The goal is around 12,000 cases when all plantings are in full production. The oldest blocks are six acres on Edna Road, grafted to 101-14 rootstock, which produced the first commercial release in 2005.

Williams is also excited by this new variety and it's potential. "We think we are onto a winner here," he says. "The wine quality is outstanding, and the variety seems well-suited to the long, cool growing season of Edna Valley."

This is a unique vineyard region, with a climate dominated by the nearby Pacific Ocean, which acts as an enormous air conditioner. In summer, the warmest part of the day is late morning, before onshore cooling winds have an impact.

In this mild climate, irrigation control is essential. Normally irrigation does not begin until June, but the 2006/2007 winter was dry, so irrigation commenced earlier. (Of course Williams has irrigation in his genes, as his father Larry of the University of California at Davis is a world class expert on the subject!) Up until fruit set, irrigation is 85% to 100% of Et, then 40% to 50% until veraison.

Williams is less assured about canopy management and fruit exposure. He suspects that fruit exposure may impact Albariño style, as he has found with Sauvignon Blanc, and so he continues to experiment in the vineyard. In July, Williams and other Paragon Vineyards staff travelled to Rias Baixas in northern Spain to study the grape in its homeland.

I asked Williams if Paragon's interest in new varieties is confined to Albariño. "No," was the emphatic reply. "We are also looking at other Iberian varieties like Verdelho, Lourao, Trincadera, Verdejo, and Godello, and also Gruner Veltliner from Austria. Paragon senses an increased demand for new, alternative white varieties."

Matching varieties to climate

I feel quite confident that some of the varieties Williams cites will perform well in Edna Valley, but not all. For example, the Austrian climate of hot summers and freezing winters is quite the opposite of Edna Valley, so it is difficult, using my homoclime technique, to predict how Gruner Veltliner might perform. It may not ripen properly.

Lourao is from Galicia in Spain, and seeing that Alvarinho does well in Edna Valley, I predict that Lourao will also. Trincadera and Verdejo are from warmer parts of Spain, so again I am unsure about their possible Edna Valley performance. They will likely do better in warmer areas, such as nearby Paso Robles' warmer eastside.

What I do like about Williams and Paragon Vineyard owners John Niven and Michael Blaney promoting these new varieties is their understanding that there are more new varieties out there than just the French ones.

Spain and Portugal are a treasure chest of varieties, many of which are better-suited to California than are the varieties of France. Can you imagine that?

Paragon is just scratching the surface. The new New World will be Iberian in flavor, and the next one will be Eastern European! That is my tip for the next 50 years.

A tip to a friend

I conclude this column with some thoughts for Scott Williams to ponder. First, are there more Iberian varieties out there that have slipped under his radar? Much to my editor's angst, I delayed writing this column until my annual trip to Spain, where I sought some ideas about what is new in terms of indigenous varieties.

My esteemed friends at the winery and vineyard Pago del Vicario near Ciudad Real (in Spain's La Mancha region), noted for their innovation, and about whom I will write in a future column) gave me some advice: They suggested Mencia for a red wine and Godello for a white. Both are indigenous in cool Galicia, and so at first sight, may be well-suited to Edna Valley.

Mencia is all the rage in Spain right now, and its reputation is slowly

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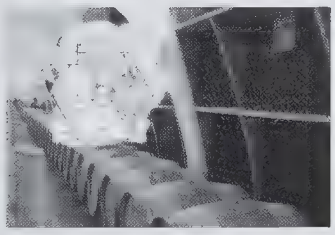

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spreading overseas. I enjoy the wine. I can best compare it to Pinot Noir, with a soft, low-tannin palate that is very flavorsome. Maybe someone should make a movie about it!

Godello on the other hand is similar to Alvarinho, but I am told it can be bottle-aged, as is the case for Gruner Veltliner. Godello makes a superior, young, fresh and fruity wine, like Alvarinho, and it will even tolerate some oak, like Chardonnay. I have Spanish friends who rate it above Alvarinho.

Conclusion

There is certainly more to life than French varieties. I salute Williams and Paragon Vineyards for lateral thinking; may it long continue and become a groundswell. Wine is meant to be a beverage provoking conversation; it will not be if we persevere with varietal labelling and a fixation on French varieties.

In the interest of the (Queen's) English, and relevant to the subject of this column, I introduce a competition for which the prize is a signed copy (by me) of *Sunlight into Wine*. Which of the following two sentences is grammatically correct, and why?

1. Godello is an exciting new varietal.
2. Godello makes an exciting varietal wine.

Entries can be sent to vinedoc@bigpond.net.au. The first correct answer will be responded to; the remainder will serve to remind me that someone out there reads my column. ■

Dr. Richard Smart, "the flying vinedoctor," is an international viticultural consultant based in Launceston, Tasmania, in Australia. He can be contacted by e-mail: vinedoctor@compuserve.com. Read about Dr. Smart's business, including his consulting schedule, educational wine tours, and seminars, at his home page http://www.smartvit.com.au. He visits America frequently and his consulting schedule is arranged by Vinquiry in Windsor, CA, tel: 707/ 838-6312 and http://www.vinquiry.com.

A tip to a wine industry

My readers will be aware of the problems previously caused in the Californian wine sector by a number of variety mis-naming events, and which made the California industry the butt of many jokes worldwide. I would hope that this situation would not persevere, it is not appropriate for a large, technology-driven industry.

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Paragon's tangent brand — Chardonnay alternatives

Cousins John Niven and Michael Blaney, owners of Paragon Vineyards and tangent Winery, have a master plan. It includes a mix of grafting and planting in 2006 and 2007 and staggers the timing of the vines coming into full production, allowing Paragon's Albariño program to grow at a sensible pace, rather than in one huge bound.

Additionally, Paragon's distribution has increased two-fold in the past 18 months; **tangent** wines (six white no-oaked wines) are now sold in 40 states and seven countries. The distributors are fine-wine driven, mostly mid-size houses. Their focus is on restaurants and specialty retail shops, no chain stores. Finally, as the Nivens are grapegrowers first, they realize there is always the option to sell Albariño in the niche grape market.

"Albariño is the quintessential varietal example of our vision for **tangent**," says John Niven. "There is no doubt a renewed consumer movement toward the exploration of white wines other than Chardonnay. Look at the growing interest and presence of Albariño in the domestic marketplace. You now see it more frequently in restaurants as a by-the-glass offering or as a substantial part of retailers' Spanish sets. Sommeliers show great interest in the variety for its multi-faceted food-pairing options. Retailers are having success with it because of its clean, refreshing qualities.

"We are fortunate in that the Edna Valley and the Rías Baixas have a number of similarities when it comes to growing Albariño. The end result is a wine that shares many of the same compounds and characteristics of a true Spanish Albariño.

"Although this is a very small niche to fill, it is quite honestly a whole lot more fun and inspirational than duking it out with the hundreds if not thousands of wineries producing the big three varietals. If we can be one of the few domestic wineries that is successful in producing a classic expression of this grape, we will be in a good place."

I looked up the varieties I have mentioned in this column on the new online National Grape Registry at http://ngr.ucdavis.edu (which was described by Clare Rafferty in March/April-2007 *PWV*). This is a very welcome advance for growers interested in new varieties, as it tells where they can be commercially sourced.

I found that Albariño is the Tax and Trade Bureau (TTB) prime name for Alvarinho.

I could not find Mencia on the list, sadly it is apparently not available in the U.S. The variety Verdejo has Verdelho listed as a synonym, which is incorrect, they are two different varieties. Both are listed as being available at several nurseries, I hope there is no confusion here. Also Godello is listed as a synonym for Verdelho; so far as I know this is also incorrect, they are two distinct varieties.

One reference source listed is a TTB list of prime names, to a link that does not work! It would not take too much study to contact Spanish and European specialists to tidy these synonyms.

—R.S.

Tangent Albariño winemaking

Three clones of Albariño were harvested in late September in 2005 and 2006. Average Brix in 2005 was 24.2° with a yield of 3.1 tons per acre, and 22.1° in 2006 with yield between 2 and 3 tons per acre. Grapes are whole-cluster pressed. Approximately 2% of the Albariño juice [hard press] was blended into the tangent Ecclestone wine-blend.

M2 yeast was used in the 2005 fermentation at 52°F in stainless steel. VL3 yeast was used in the 2006 fermentation at 55°F in stainless steel for 47 days to achieve dryness. The wine lots remain on the gross yeast lees to keep the wine in a "reduced" stage until blending one month before bottling, heat and cold stabilization. No malolactic fermentation or oak contact in either vintage.

Finished alcohol in 2005 was 14.1%, and 12.91% in 2006. Acid at bottling in 2005 was 7.3 g/l with 3.24 pH. Acid at bottling in 2006 was 7.05 g/l with 3.54 pH. Both wines were bottled under screwcap.

Production was 210 cases in 2005 and 342 cases in 2006.

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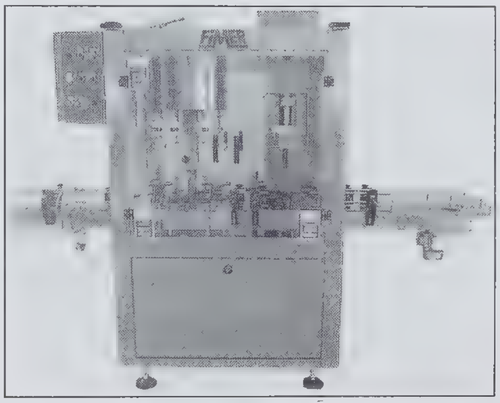

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VERJUS REDUX

Wineries rediscover an ancient use for culled grapes

BY Bo Simons

Verjus, from a French word meaning "green juice," is the green, unfermented juice of not-fully-ripened grapes. Used for thousands of years as a sauce component and condiment to give dishes a little acidity, Verjus has enjoyed a resurgence in the past dozen years as a favorite of chefs and the culinary elite.

Verjus holds promise for vineyard owners in making use of culled grapes they might otherwise leave on the vineyard floor — and for wineries and entrepreneurs as an emerging gourmet product whose potential has yet to emerge.

Verjus comes from grapes picked as they reach veraison, the final spurt of ripening when berries acquire color, sugar, and softness. Juice from these unripe berries has been used as a cooking ingredient in Europe since at least Roman times. It became a component of making Dijon-style mustard.

Verjus remains a staple of Middle Eastern cookery today. In Iran it is called *abghooreh*, and in Lebanon it is known as *hosrum*. In western cuisine, verjus was superseded by lemon juice in the 19th century. In the 1990s, verjus started a comeback. Gourmets and a number of chefs began seeking it out because of the intriguing flavor it imparts to salads and sauces, and for its use in deglazing.

Diners and menu planners like that it allows a salad dressing with vinegar's tart acidity, but without an antipathy to wine. With verjus, you can enjoy a wine with your salad.

Several wineries in the U.S. and Australia produce verjus. At least one food and wine operation in Australia does an active trade in it, and one entrepreneur in Napa (Fusion Foods) has built a business around it.

Cabernet Franc to be picked for Verjus at Garden Creek Vineyard, Geyserville, CA.

Commercial vineyards may drop a ton or more of unripe grapes per acre to even out ripening and enhance the quality of the remaining fruit. Most of this culled fruit is left to compost in place. Verjus offers the potential of using this byproduct of commercial viticulture in the creation of a saleable item. What follows is a review of how two producers in California and one in Michigan are making and marketing verjus.

NAVARRO VINEYARDS

Navarro Vineyards in Mendocino County has been making verjus for more than 12 years. The 30,000-case winery started making just a few gallons of it as a favor for a local chef, and now produces several hundred cases almost every year.

Background

Ted Bennett started Navarro Vineyards in 1974 as one of the pioneer wineries in the Anderson Valley. Almost from the beginning, he liked the idea of varietal grape juices, so he began producing them for sale in the tasting room and to restaurants.

Late in the 1980s, Vern and Charlene Rollins of the New Boonville Hotel asked Bennett for some verjus, and he offered to make them some from second crop Chardonnay. Bennett recalls, "She said, 'No, no, I only want first crop.' Because she had been to France, and insisted that second crop wasn't as good as first crop. We discovered it's absolutely true…"

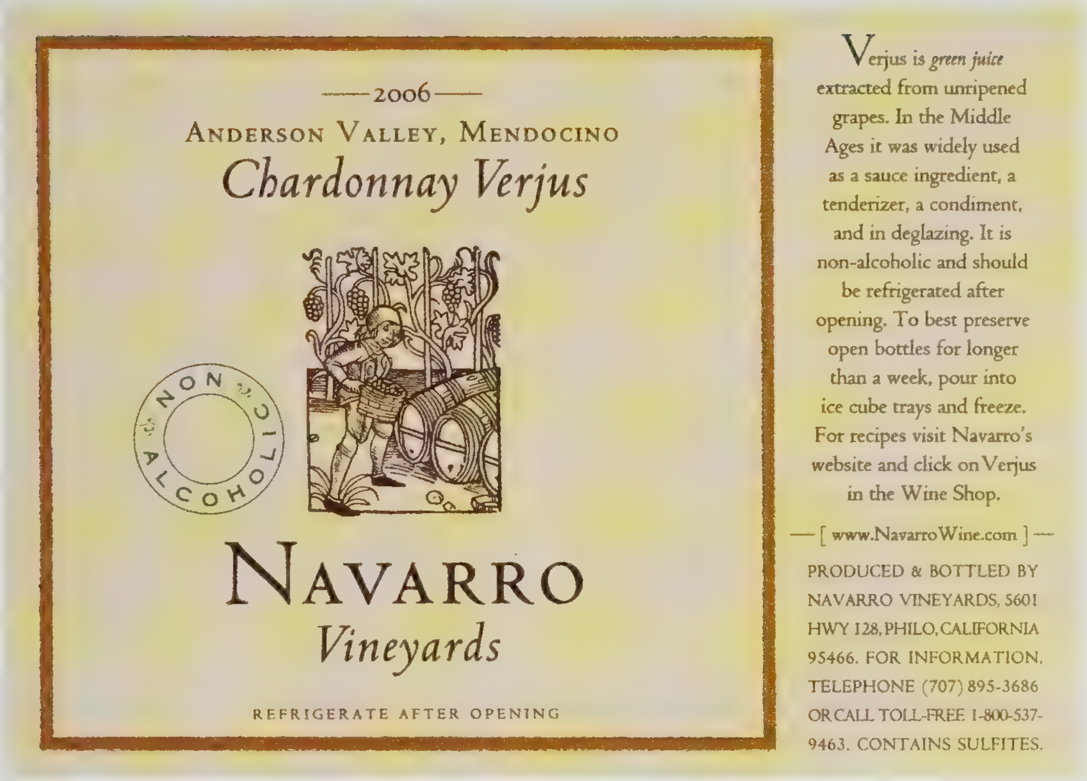
They made small lots, and other chefs such as Margaret Fox at Café Beaujolais in Mendocino, liked it. Jim Klein joined the winery as winemaker, and in 1993, Bennett asked if he could produce enough verjus to send out a bottle as a present to every customer on the mailing list.

Klein considered the production challenges of making several thousand 375 ml bottles of a product whose microbial stability is problematical, and thought he could do it. Since that thank-you gift to customers, Navarro has made 200 to 500 cases per year, depending on the quantity of thinned fruit. Some years, for various reasons, a verjus is not produced.

Production

Klein describes the overall process of making verjus as "deceptively simple." They thin Pinot Noir and Chardonnay grapes in August, right after veraison, when they are low Brix — between 11 and 14. They take green clusters into the winery to crush and press the same day. Crushing is necessary — Klein considered and rejected the concept of whole-cluster pressing.

Once the juice is pressed from the grapes, the next step is to get the juice as clean as possible. Like Navarro varietal grape juices, the verjus is bottled without any sorbates or velcorin. Klein likes to cold- and heat-stabilize the juice quickly. The juice is first put through a lees filter, then through a diatomaceous earth filter, and finally through EKS pads (4- or 5-micron pads), into a tank that has been thoroughly washed with hot water.



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Verjus is *green juice* extracted from unripened grapes. In the Middle Ages it was widely used as a sauce ingredient, a tenderizer, a condiment, and in deglazing. It is non-alcoholic and should be refrigerated after opening. To best preserve open bottles for longer than a week, pour into ice cube trays and freeze. For recipes visit Navarro's website and click on Verjus in the Wine Shop.

— [www.NavarroWine.com] —

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"I like to add SO_2 right after we've removed all the solids," explains Klein. "We cold stabilize it that night." He keeps the SO_2 level low, at about 50 ppm, used strictly as an antioxidant. These filtration and stabilization steps are not strictly needed for flavor, Klein admits, but for visual appeal: "People like a clear product on their shelves."

He likes to keep the juice very cool and then bottle it within 10 days because the longer it takes to bottle, the greater the risk of the juice picking up some yeast activity. The trouble with juice in a winery is that it naturally wants to pick up some yeast and start to ferment. "The sooner you get it in bottle, the better you are going to sleep at night. I like to bottle it before there is a heavy yeast load in the winery."

A membrane filter is not used at bottling. The juice goes through EKS pads right into the bottle. Klein has usually filtered the day prior to bottling.

"We label the bottles after four to six weeks," notes Klein. "We'll check them during that period, make sure we don't have anything growing in there. Then, we'll label when we're confident we have no growth. What's nice about juice bottling is that the proof is in the pudding. Every bottle is like a science project. If there is a microbiological problem, you see it right there when you put them against a bright inspection light."

Klein reports fewer problems with verjus than with the winery's Pinot Noir or Gewürztraminer grape juice. With the varietal grape juices, the loss rate is about 5%. Verjus, with less sugar, more acidity, and a lower pH, has a loss rate of about 0.05%.

One concern Klein has with verjus involves scheduling: getting it made and bottled before the wine crush begins.

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Chardonnay comes to veraison in the Anderson Valley about mid-August, and Pinot Noir, the first wine grape harvested there, reaches maturity about three weeks later. Although he would like to have the verjus bottled before the Pinot Noir harvest begins, Klein says, "We often end up crushing Pinot Noir and bottling verjus in the same time frame."

Marketing

Navarro sells verjus through the tasting room and mailing list, with many chefs among the customers. The winery started out 12 years ago bottling 375 ml bottles as a customer gift concept, but have since switched to 750 ml bottles. Finding the smaller bottles proved too difficult to justify the cost and effort.

Although Klein and Bennett admit that the smaller bottles might have some consumer appeal, they say the larger bottle is much easier to produce. A bottle will last several days before it begins to lose some flavor. Re-inserting the cork and refrigerating the verjus will stretch a bottle's shelf life to several weeks and perhaps months before it flattens completely. Some customers extend the life of the product by freezing it in ice cube trays and defrosting the cubes as needed.

Navarro's marketing efforts with verjus over the years have been sporadic and reflect that it is not the winery's main product. They sell it all through their website, mailing list, and tasting room. Several years ago, Navarro solicited recipes using verjus from local chefs and published a small printed cookbook, which is still available in a second edition, online both in viewable and printable formats at: http://www.navarrowine.com/shop/productdetail.php?prodid=340#.

Ultimately, Navarro makes verjus for two reasons, says Bennett: "We think it's a really nice product; and we really like making it. It's sort of like our grape juice … a product that could be expanded nationally if someone really wanted to do it. But that's not our business. Our business is to have a reasonably nice life, and make wine."

GARDEN CREEK VINEYARDS / TERRA SONOMA VERJUS

At Garden Creek Vineyards (Geyserville, CA), a younger generation with a similar small-scale sensibility has put a slightly different twist on verjus production and marketing. Justin Miller and Karin Warnelius are the husband-and-wife principals of a second-generation family-run vineyard that is adding a winery and a verjus business to its farming and grape-selling enterprises. They see their mission in verjus as ecological: turning a waste product into a useful and profitable product.

Background

Both Miller and Warnelius grew up in Alexander Valley farm families. Miller has taken over his father's vineyards and

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pointed them in a more consciously organic direction than his father had. In the last several years, the couple has started both a high-end, small winery (Garden Creek Vineyards) and a verjus company called Terra Sonoma.

Karin Warnelius was born in Sweden and grew up in Alexander Valley. Her family immigrated to this country, and had a 200-acre ranch near Geyserville. She attributes her organic and holistic approach to her background and upbringing.

Miller grew up on the ranch his father bought in Alexander Valley a few miles south of where Warnelius lived. They knew each other as children. Miller's father, a fifth generation California bought the property and developed the ranch in the late 1950s.

Like his neighbor, Robert Young, the elder Miller did other types of agriculture — mainly cattle ranching — before he started planting grape vines in the early 1960s. He developed a reputation for high quality Cabernet Sauvignon, Merlot, Cabernet Franc, and Chardonnay from his hundred acres of vineyards on two separate ranches.

He sold grapes to several wineries, including Jordan, Geyser Peak, Ferari Carano, and Grand Cru. Miller remembers an idyllic childhood running around the ranch, and has been working actively in the vineyards for 12 years since he was 18. He has taken over, after college, from his father who retired several years ago.

Warnelius pursued her own goals that included college, working for her father's winemaking operations in Sweden, and being a sales representative for several wine companies. Together since 1997, Miller and Warnelius are dedicated to raising a family and growing Garden Creek and Terra Sonoma as businesses.

Getting started

Miller's father gave them the idea for verjus. He saw an early commercial verjus about 10 years ago and urged them to try making the product because he had just experienced two huge crops. As a farmer who hated waste, he liked the idea of being able to use the tons of fruit dropped on the ground as part of the crop thinning routine.

Warnelius and Miller did not immediately take the advice and jump into verjus production. Consumed with other projects that included building a small winery and launching their own wine label, they put it off a few years, but eventually they investigated verjus production in a systematic manner.

They were surprised at how close-mouthed verjus producers were. "No one would tell us how to make it," recalls Miller. They gathered all the commercial verjus they could and tasted it. "It came to a whopping five or six bottles," laughs Warnelius, "but every producer has their own flavor profile." They came to like a sweeter profile, less astringent than Navarro's,

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more like the Maggie Beer verjus (called Verjuice) from Australia.

They decided on the sweeter taste because they liked it, and, as a new product, they thought the sweetness would appeal. A potential consumer can actually sip and swallow Terra Sonoma verjus. It is not bitter and acidic. Although you are not supposed to drink it, a potential customer would have a smaller hurdle to jump with a literally easier-to-swallow product.

Production

Miller starts verjus production when the average Brix of grapes in his vineyards indicates he can thin out enough to make a batch. The challenge is to get enough culled fruit from the vines in one day to make one batch of it. After several years of increasing production, a batch is 1,300 to 1,400 gallons. He sends a crew out to thin and harvest the thinned fruit when the fruit is about 12° Brix.

"I like to do it at about 50% veraison," Miller says, "Some blocks will be at 20% veraison, and some blocks will be at 90% to 100%. Some stuff we're picking at 14° Brix, and some we're picking at 10° Brix. By the time we get through and blend it together, we're at 11° or 12° Brix. We try to blend it for our flavor profile." Warnelius and Miller maintain, and a taste confirms, that Terra Sonoma verjus has an overall sweeter flavor than Navarro's, but the Brix numbers are about the same.

"We'll take a batch and whole cluster press it," says Miller. "We cold stabilize that juice." Then he adds 35 to 40 ppm of SO_2 to inhibit oxidation. "Then we rack from one tank to another to get it as clear as possible. A lot of sediment, the heavier stuff falls out .... We'll get an additional clarification with addition of Sparkalloid." (Sparkalloid is a Scott Laboratories' clarification product for clarifying juice and wine.) Miller will sometimes do up to three rackings to get to the desired clarity.

The juice is sterile filtered into beer kegs that work wonderfully for several reasons. They are easier to store and move around than cased bottles. In a small operation without unlimited operating capital, it saves money: they do not have to invest in expensive bottles and labels until they are ready to sell the product. Having the product in beer kegs — a stable, cheap and portable method of storing the verjus until they are ready to bottle and sell it — keeps the cash flow demands low.

Miller reports very few production problems, and very few bottles that go bad. They had a couple of shot corks in the beginning, and one case of verjus was returned, but he suspects that was mishandling on the customer's part. He attributes the low error rate to an obsessive concern with sterilization, and close attention to the fill height of the bottled product. "Your fill height is

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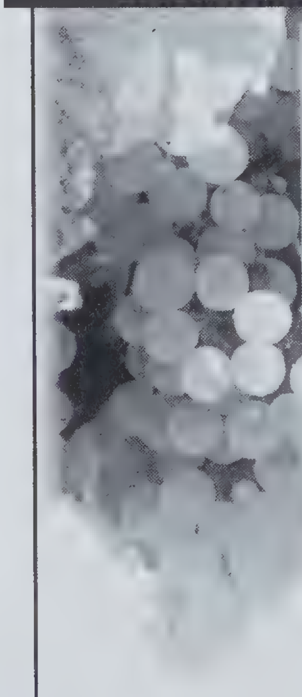
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so crucial," notes Miller. "You don't want to leave just an eighth of an inch space below your cork, and you don't want to leave one-half inch."

Warnelius and Miller were building their small winery by remodeling a barn when they were starting their verjus business. Although they switched production to their own winery in 2006, at first they used equipment at Clos Du Bois.

The arrangement with Clos Du Bois was mutually beneficial. The Clos Du Bois winery production crew were able to try out their equipment before the wine grape crush actually was upon them on a product in which they had nothing invested, verifying that all their equipment was working correctly. Clos du Bois traded the ability to get their equipment ready for the use of their equipment.

The pressing, sulfuring, cold stabilization, racking, clarifying, and sterile filtration was done at Clos du Bois. The basically finished verjus was put in kegs and transported to the Garden Creek Vineyards storage facility (now their winery). The 2006 verjus production was done in their own winery in much the same manner, but in their own space and with their own equipment.

Marketing

Warnelius, who handles marketing, notes the major challenge in selling Terra Sonoma Verjus is educating consumers about the new product. "It's not something most people use. The chefs, the food professionals know what verjus is, and are willing to try a new brand."

Her goal is to aim high. "Our target audience is food- and wine-savvy people," says Warnelius. "We set our price high because it costs a lot to produce, and we know, with a new product, price creates value. People respect a product with a high price."

Terra Sonoma sells verjus in 375ml bottles for $15 per bottle, which means their cost per ounce is more than double what Navarro charges ($11 for a 750 ml bottle). Terra Sonoma Verjus also sells a three-gallon bag-in-box to restaurants. They started out with 100 cases after the 2004 harvest, and produced about 500 cases from 2005. The 2006 production is about 1,100 cases.

Their methods are personal and hands-on, a very "kitchen table" sort of marketing, but a smart and purposeful kitchen table. Warnelius has graphics arts savvy and designed the label and their promotional materials. They do some sales directly to consumers from their website, Terra Sonoma Food Company (http://www.terrasonoma.com/).

With a background in wine sales that includes stints at a French négociant in San Francisco in international sales, and as a sales rep for Kendall-Jackson, she knows how to prepare a list of potential clients, and then work the list by phone and in person. She has put the product in a number of fancy grocery stores. She

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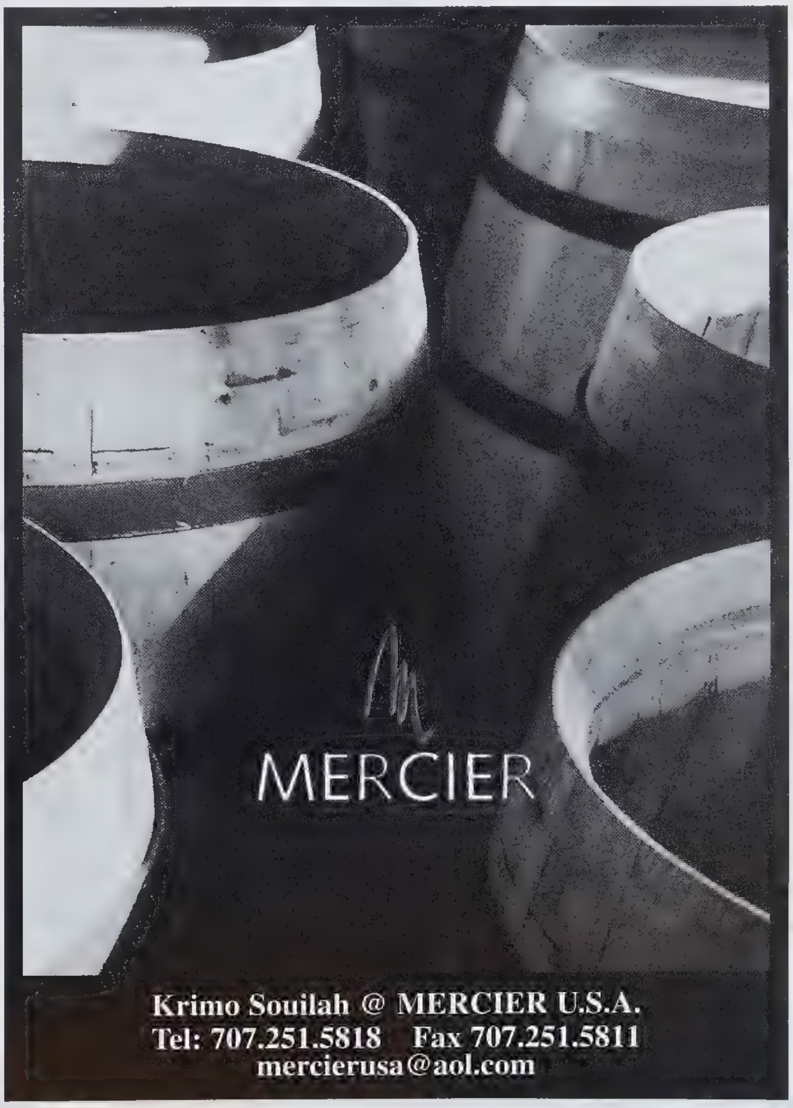
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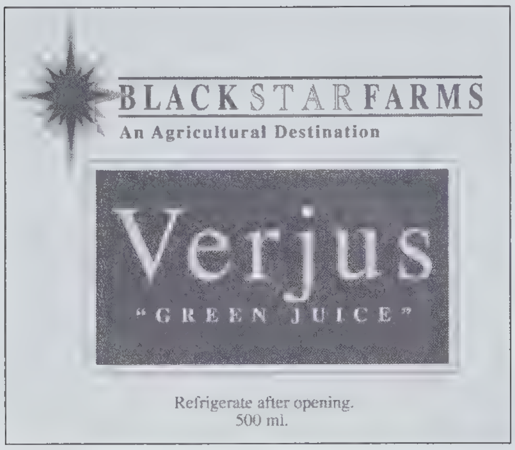

sells to stores in California from Santa Barbara to Eureka.

She has also partnered with Jane St. Claire at her Savor California website, a sales portal for "gourmet specialty foods and beverages from California." Another avenue she has tried is food shows, among them the 32nd Winter Fancy Foods Show (2007) in San Francisco. Their verjus won a double gold medal and Best of Show in the 2006 Sonoma County Harvest Fair.

Their volume now remains such going through distributors and wholesalers does not make sense, but if they continue to grow, it is a potential option. Should they go through one or several fancy foods distributors, cutting the time and expense of selling to many retailers, or hire their own sales person or persons and distribute the product themselves?

Black Star Farms

Black Star Farms styles itself as an agricultural destination, with a winery, distillery, inn, stables and creamery as parts of their business in Suttons Bay, Michigan. They have been producing 100 to 200 cases of verjus for the past six years. Their winemaker, Lee Lutes, refers to verjus as a green harvest tool.

Production

Black Star produces verjus by taking culled fruit three to four weeks before harvest. They select from their assortment of grapes, typically picking Pinot Noir, Pinot Gris, Pinot Blanc, Chardonnay, Riesling, or Cabernet Franc. Like Navarro and Terra Sonoma, the fruit selected for the verjus is what they would select to balance a heavy vineyard crop.

Unlike either Navarro or Terra Sonoma, Black Star might supplement the culled fruit with fully ripened high acid varieties such as Vignoles. The culled fruit goes through the crusher/ destemmer before pressing because it is very firm and difficult to press on its own.

They strive to bottle it quickly in 500ml bottles, picking this size because it matches some of their other non-alcoholic products. They have experimented with different shapes and sizes of bottles over the years, but the 500 ml size remains the current package.

Often production scheduling or other factors force them to wait until after the grape harvest. The cool climate and higher acidity work to lessen fears associated

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with microbial spoilage that may affect the bottled verjus in warmer California. While some lots have been hand-labeled, this is not a practice they intend to continue as production increases.

Marketing

Black Star sells most of its production through its tasting room, even offering tastes to visitors. They wholesale small quantities to local restaurants and chefs who know verjus and appreciate a local product. Lute comments "We see it as a supplemental product that enhances our tasting room experience and further connects us to the culinary community," says Lutes. They have hopes of growing the verjus production to 500 cases per year, more than double their current production but still in the boutique range.

Conclusion

These three verjus producers show varied responses to the interest in verjus that has blossomed over the past several decades.

Navarro Vineyards is one of the oldest commercial verjus producers in the U.S., but they keep it as a background product in their winery. They have made it for many years, given it as a gift to their good customers, produced a cookbook, and are not spending tremendous time and energy promoting the product and growing the market for it.

Terra Sonoma has all the potential and problems of a young business with a lot of thought and energy behind it and many interesting challenges ahead. They are trying new ways to reach people, and they are a young couple and company with the energy and optimism of youth and the benefit of some experience coupled with a level-headed approach to growing their business.

Black Star Farms has successfully incorporated verjus in a small way into its array of wine and farm products, and hopes to more than double its production, but, at a projected 500 cases, it will still be a modest undertaking.

None of these three verjus businesses is huge, but they are but three of perhaps dozens of verjus experiments being done by vineyards and wineries and entrepreneurs from Australia to Long Island, New York

This brief look at these producers and the current market only raises questions: What will become of verjus? Can it scale up significantly? Does it have the potential to make some serious money out of a waste product, from which most vineyards currently derive only minimal composting value? Does this niche product have broad appeal? Stay tuned. ■

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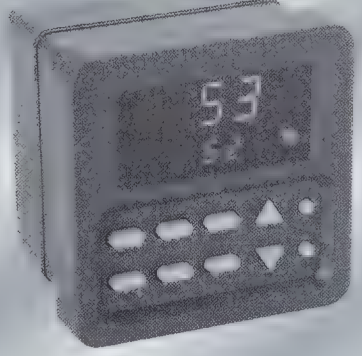

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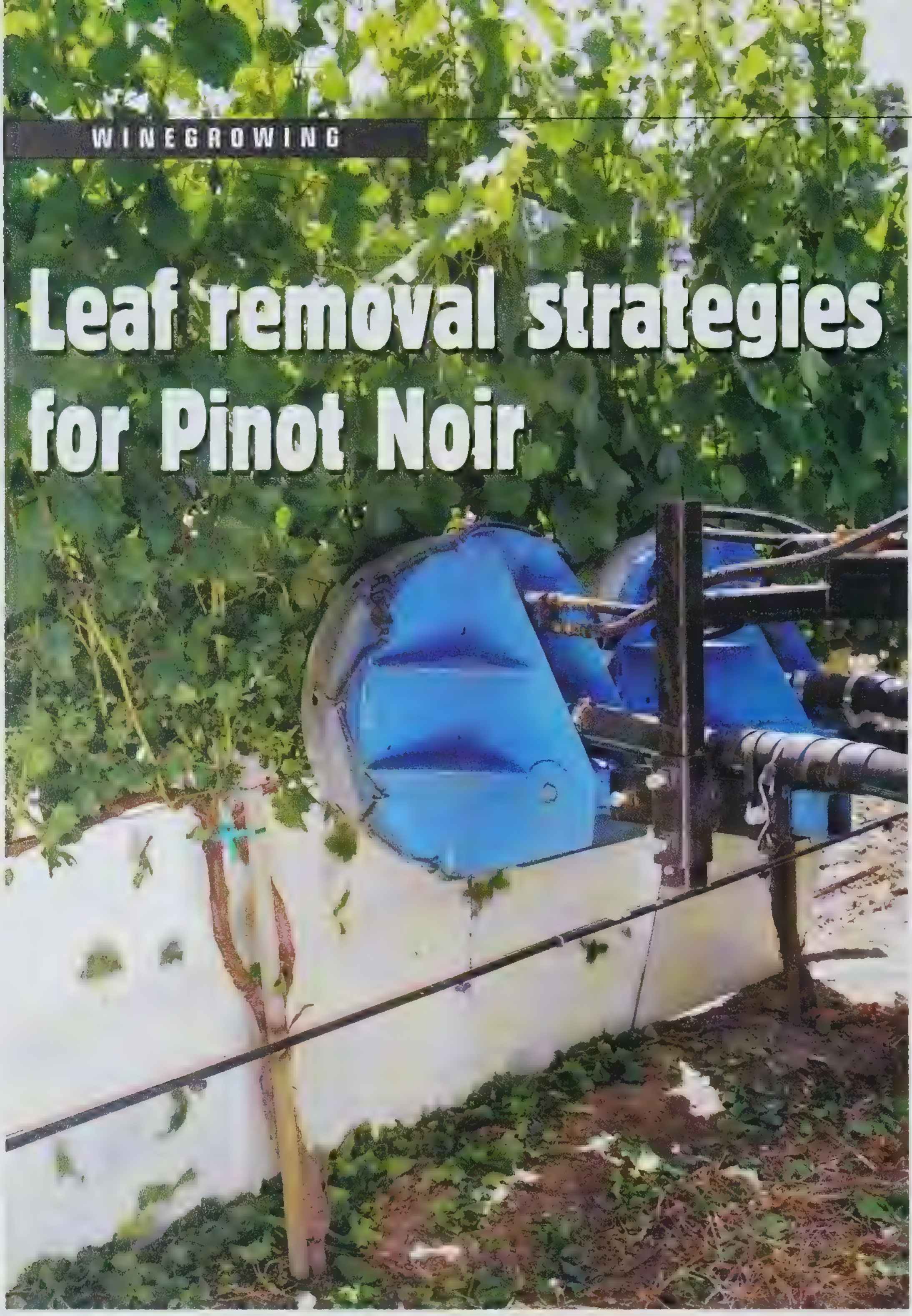
Leaf removal strategies for Pinot Noir



Mechanical leaf removal of Pinot Noir at Buena Vista Carneros with a Precision Leafer built by Grape Harvester Sales (Fresno, CA) traveling at 2 to 2.5 miles/hour.

BY Nicolas Cantacuzene, Emeritus Vineyards, Sebastopol, CA

Leaf removal is a widely used practice in California to fight disease pressure and influence wine quality. While it is agreed that leaf removal is beneficial, in California excessive removal (known as "over-leafing") could affect grape quality. Pinot Noir, though not as photo sensitive as Sangiovese and Grenache, is thin-skinned and is therefore more prone to sunburn, disease, and temperature increase.

Winegrowers have practiced leaf removal to influence different wine styles and allow air circulation to fight disease pressure.

Since *Sunlight into Wine* by Richard Smart and Mike Robinson was published, winegrowers have been favoring more fruit exposure, but at what cost? A recent article written by Mark Greenspan has underlined the excessive practice of leaf removal and its impact.

The object of this article is to survey a number of wineries to determine what methods and motives are behind leaf removal in high quality Pinot Noir production in California.

Among the people surveyed, most winegrowers appear to practice leaf removal to some degree. Two schools of thought emerge from this survey — growers who carry out leaf removal to varying degrees and growers who favor shoot thinning and lateral removal.

It appears that over-leafing was more predominant a few years ago, as Michael Browne (Kosta Browne, Sebastopol, CA) notes: "A few years ago many of our growers were stripping the fruit zone because that was what everyone was doing."

However, recently there has been a tendency among most growers to refrain from fully exposing the fruit zone. They have observed that stripping the fruit zone could negatively influence grape quality: "If high heat occurred, as it often does, the clusters would dehydrate quickly and also get bleached by the sun," adds Browne.

The main reasons behind leaf removal for most growers are combating disease by allowing more air flow, favoring skin thickening, and influencing wine style. However, there are a range of options pertaining to the quantity of leaves to be removed or retained without damaging the grapes or the vine.

A typical program for growers is to practice leaf removal (also known as "leafing") on basal leaves at fruit set or thereafter, and not on the afternoon side, unless it is a high disease pressure year. Removing leaves at fruit set allows the fruit to acclimate to a certain amount of sun exposure and promotes bud fruitfulness for next year's crop.

Browne is experimenting with leafing pre-bloom on basal leaves in order to encourage next year's bud fruitfulness, promote light into the canopy earlier, and facilitate operations for his crew before the canopy grows too large.

Browne observes that early leafing produces "a bit of shatter and a more open cluster which we like. The remaining leaves tend to grow down and protect the fruit zone also." However, he notes that the clusters are not protected, which could be troublesome if there is rain or wind at bloom.

More traditional leaf-removal programs promote leafing at fruit set. The extent to which leaves are removed varies among growers. Marty Hedlund (Dehlinger Winery, Sebastopol, CA) says, "We shoot-thin, shoot-position, remove leaves and laterals, cluster-thin, and cool the fruit zone with sprinklers (if necessary). Fruit/wine quality and plant health are the reasons for incorporating these operations into our efforts. The degree to which we use any, some, or all of the above is dependent upon the wine, variety, and site."

Scott Zapotocky (Paul Hobbs Wines, Sebastopol, CA) says, "We leaf approximately half the basal leaves on the eastern side of the vines to increase air flow and filter sunlight to the clusters. We do this in late May/early June, or once vine growth slows down."

One advantage of leaf removal is a thickening of the skin, and better air circulation that allows for fewer incidences of disease. Ginny Lambrix (DeLoach Vineyards, Santa Rosa, CA), who manages many vineyards in the Russian River Valley and on the coast, evaluates her need for leafing at fruit set on a case-by-case basis.

"The light environment is one of the factors I consider," says Lambrix. "If the vineyard is organic, in a high fungal pressure area, prone to tough tannins or low color, or has produced vegetal wine, then we pull basal leaves. If the vineyard is weaker, thus smaller leaves and better light, I am less inclined to pull leaves, but shoots have to be positioned and C-clipped to retain air flow and the light environment. I never pull leaves late."

Kirk Lokka (Emeritus Vineyards, Sebastopol, CA), notes that sun exposure produces softer tannins and gives the perception of early maturity. "Leaf removal is necessary in the Russian River Valley due to the fog influence," adds Lokka.

Steve Dooley (Stephen Ross Wines, San Luis Obispo, CA), who grows grapes in the cool climate of the Central Coast, believes, "Sunlight on grapes makes dark, flavorful wines with polymerized tannins."

Some winery clients of Jeff Newton (Coastal Vineyard Care Associates, Santa Ynez, CA), who manages vineyards in Santa Barbara County, prefer full sunlight as a way of advancing stem maturity. "Their style of winemaking," he says, "includes extensive stem inclusion and they need those stems to be as mature as possible." This extreme leafing technique requires cool summer conditions in order to avoid sunburn.

Dean de Korth (Bernardus Winery, Carmel, CA), who practices leaf removal to some degree in Carmel Valley, encourages filtered light and tries to "avoid sunburn at all cost. If heat is eminent, leafing might be postponed."

Depending on weather conditions, proponents of leaf removal will adapt their regime. Mark Bixler (Kistler Vineyards, Sebastopol, CA), says, "Since we are in the Russian River

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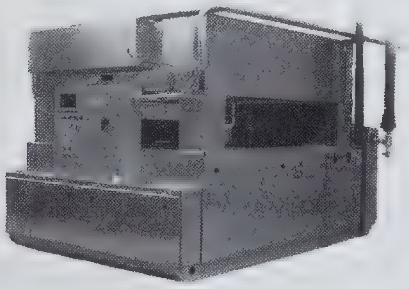

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Dr. Bob Wample (Cal State University, Fresno), notes that, in his opinion, people should be cautious about which leaves they decide to remove. "In most situations I would restrict leaf removal to those leaves positioned at or below the cluster on the shoot since those above the shoot are the primary source of carbohydrates for the developing cluster. More leaves on non-bearing shoots can be removed to improve light penetration and reduce the potential for powdery mildew infection if desired."

Some growers have been producing high-quality fruit by shoot thinning and lateral management. Many winegrowers who practice minimal leafing believe appropriate canopy management is adequate to bring the fruit to maturity without mildew incidence and loss of varietal character. The belief is that shoot thinning gives an adequate amount of filtered light to the clusters and promotes even ripeness of the fruit without substantial fluctuations in temperature.

Daniel Roberts (Integrated Winegrowing, Sebastopol, CA), who advises a number of growers in cool climates, notes that, "Grapes on leafed clusters are five to ten degrees warmer in afternoon sun depending on row direction."

Roberts does not believe in leaf removal as a general rule and uses shoot thinning as a means of managing the canopy. He advises his clients to cane-prune, shoot-thin to three shoots per foot, position shoots with branch locks, and also remove laterals in the fruit zone, one node above the top cluster, morning side only. Roberts considers shoot thinning and lateral removal appropriate for combating disease. Roberts says, "These techniques lost less than 1% of the Pinot Noir or Chardonnay to Botytris."

Other growers also believe leaf removal is not suitable for their program and prefer focusing on canopy management. Doug Braun (Presidio Winery, Santa Ynez, CA) in the Central Coast region believes in lateral removal and acknowledges that leaf removal is beneficial in combating disease. He believes filtered light is appropriate and that leaf removal does not "move varietal character in the right direction or help grape maturity."

Randy Heinzen (Director of Viticulture, Saintsbury, Napa, CA), who practices leaf removal, considers the management of laterals a very important tool. "If managed properly, laterals or lack of laterals," says Heinzen, "can drive late season ripening and be responsible for protection against sunburn."

Proponents of shoot thinning believe that this technique provides an appropriate amount of sunlight to fruit and promotes even ripeness. Some growers, observing the increase in leaf removal stimulated by Smart and Robinson, have re-evaluated their practices and have favored shoot thinning over leafing. Most of the methods proposed by Dr. Smart for leafing are adapted to more vigorous sites. For most of the proponents of shoot thinning, filtered light is adequate to carry berry ripening and sugar accumulation while maintaining varietal character, without a high incidence of mildew.

Many people interviewed believe filtered or dappled light is preferable to direct sunlight. However, there seems to be a wide variety of options concerning the amount of light to which the clusters are exposed. Too much fruit exposure will burn the fruit, whereas too little will influence development of green characters.

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Depending on the region and style of winemaking, growers will either shoot-thin or remove leaves as a function of the style of winemaking. Roberts does mostly shoot thinning in cool regions.

Fred Scherrer (Scherrer Winery, Sebastopol, CA), observes, "I think sun exposure has more to do with fruit personality than with speed of ripening. Excessive exposure can lead to too many base notes and tannin, not enough perfumes and grace."

Newton notes that high-quality grapes can be grown under a wide variety of canopy management scenarios in the Santa Ynez Valley. Some clients ask Newton for maximum leaf removal and others simply trim laterals retaining two or three basal leaves. From his observations, he believes leaf removal is mainly a function of wine style. "Not leafing can result in slight vegetal flavors while overexposure can reduce fruit flavors in the wine," says Newton.

Anytime leaves are removed, it will increase berry temperature. Some regions might require an increased berry temperature, whereas other regions will require that it be lower. Temperature and *not* light incidence was found to have a detrimental effect, increasing the accumulation of anthocyanin. Studies conducted by Nick Dokoolizian et al. suggest that the beneficial effects of light decreased with elevated fruit temperature.

Mark Greenspan (Advanced Viticulture, Santa Rosa, CA), says: "Higher fruit temperature will have little effect on sugar accumulation, but will increase the rate of berry metabolism." Sunlight is indeed needed to fully develop fruit composition. However, if the fruit temperature is elevated (about 85°F), there is a decrease in color and phenolic development, and also a higher pH and lower titratable acidity.

Proponents of shoot thinning believe there is a balance between sugar accumulation and berry metabolism. If the berry temperature is too high, berry metabolism will occur at a different rate than sugar accumulation. In choosing a canopy management program, it is important to consider the balance between sugar accumulation and berry development. Ideally, these processes should evolve in conjunction. Heinzen notes that "proper leafing helps define the rates of sugar maturation versus phenolic maturation."

Canopies should be managed with the intention of balancing the vine. There seems to be as many possibilities of leafing/thinning as there are wine styles. Either extreme of leafing or lack of it have detrimental consequences for grape/wine quality.

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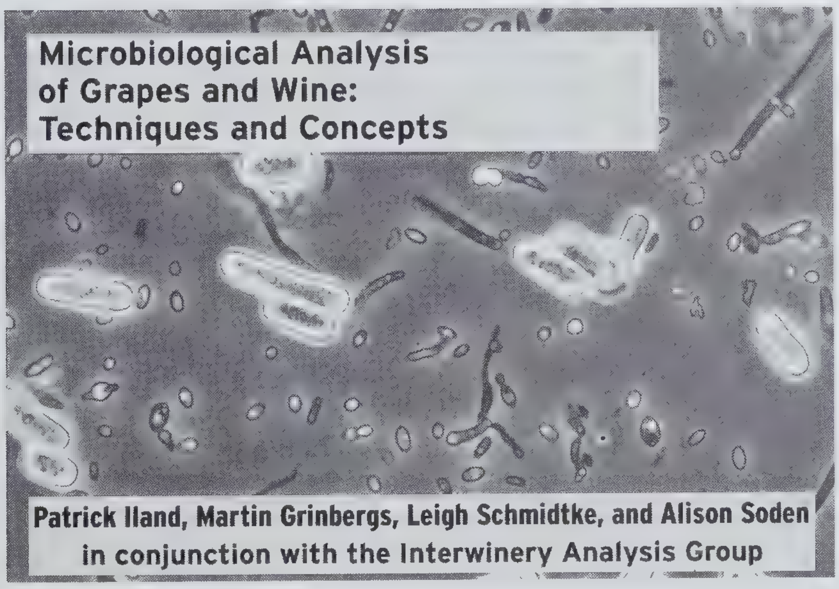
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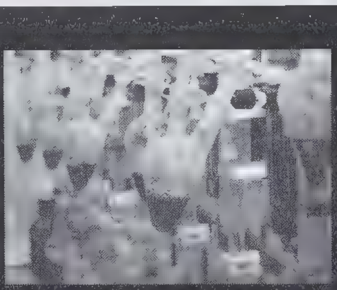
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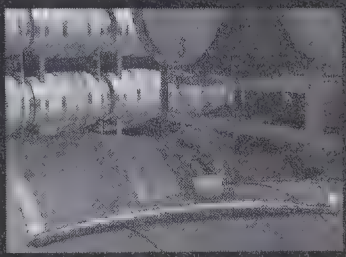
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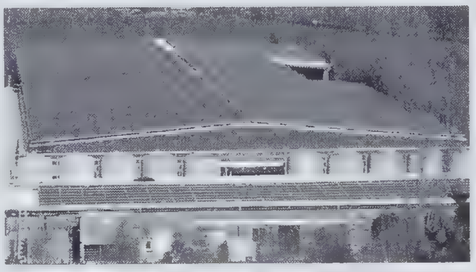

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SPURGEON PAINTING, INC.

Founded by Bob Spurgeon in 1976, Spurgeon Painting has provided award-winning painting services to wineries, commercial property owners, and homeowners throughout Napa Valley and Sonoma County for nearly three decades. Courteous, well-trained staff is one key reason why winery customers recommend and request Spurgeon Painting's services. Spurgeon Painting is dedicated to timely completion, attention to detail, safe and clean job sites, and unparalleled customer satisfaction.

Spurgeon Painting understands the specialized requirements of the wine industry. Skilled, professional crews are trained in the use of epoxy and urethane coatings for steel and concrete as well as conventional paints and stains. The finest biodegradable, non-chlorinated cleaners are always used to preserve your delicate winemaking environment.

SPURGEON
PAINTING
Lic#590008 INCORPORATED

Spurgeon Painting is committed to completing your painting project on time, on budget, and to your exact specifications, and to doing it all with sparkling and efficient customer service.

Let Spurgeon Painting show you the quality that earned the 1993 Painting and Decorating Contractors of America National Award for Excellence in Painting. Visit their website www.spurgeonpainting.com to view the spectacular work done for some outstanding vintners in wine country. Then, call for a quote on your next winery-painting project.

For more information contact:
Spurgeon Painting, Inc.
1308 Dynamic St. #8, Petaluma, CA 94954
tel: 707/763-7185; fax: 707/763-5659
e-mail: karen@spurgeonpainting.com
website: spurgeonpainting.com

AXIOM ENGINEERS, INC.

Successful winery projects by Axiom Engineers ranging from 2,000-case boutique wineries to 30,000-ton custom crush facilities include:

AXIOM ENGINEERS℠

- Gentle fruit handling systems;
- Fermentation and barrel storage;
- Wastewater permitting and design;
- Water systems permitting and design;
- Process piping systems;
- Refrigeration;
- Control system integration;
- Cogeneration and solar energy;
- Receiving and crush pads;
- Catwalk systems;
- HVAC and plumbing;
- Hospitality;
- Cave ventilation and radiant cooling;
- Fire protection and smoke control;
- LEED™ and green building.

Axiom Engineers℠ truly understands that one size or style **does not** fit all. Axiom's Engineers use their knowledge and experience to work with the winery team to determine what is right for your wine style and your business model.

For more information, contact:
Axiom Engineers, Inc.
Raymond Cole, President
Tim Ryan, VP Industrial Systems
Troy Davis, Project Manager
1712 Jefferson St., Napa, CA 94559-1703
tel: 707/251-1468 (Napa)
tel: 831/649-8000 (Monterey)
e-mail: rayc@axiomengineers.com
website: www.axiomengineers.com

PLEASE SEE AXIOM ENGINEERS AD, PAGE 47.

INERTIA BEVERAGE GROUP

Inertia's software platform, the **REthink Engine**™, is the simplest, most powerful and comprehensive customer-direct software available to the wine industry. Created by wine and technology veterans, this proprietary software allows wineries to manage the ever-changing content of their websites, on-line stores, wine clubs, phone orders, e-mail marketing campaigns, allocation and compliance issues, and in-depth reporting.

INERTIA
POWERING THE WINE REVOLUTION

Inertia starts by launching the website and training winery personnel how to use basic **REthink Engine**™ tools to manage content, then provides a dedicated Client Development Manager to help the winery grow direct sales.

Inertia also offers a revolutionary new Direct to Trade program to capture orders directly on the website from licensed retailers and restaurants in a growing number of states and to ship directly to them in compliance with state and federal laws.

Inertia's Program Development team specializes in on-line strategic partnerships to bring a brand to the attention of more customers through innovative partnerships and logical marketing solutions.

The **REthink Engine**™ was designed to bring wineries closer than ever to customers on a single, streamlined, easy-to-use platform, saving time and reducing administrative costs. The **REthink Engine**™ has already been profitably implemented by more than 350 brands of all sizes.

For more information, contact:
Inertia Beverage Group
1190 Airport Blvd. #200, Napa, CA 94558
tel: 800/819-0325; fax: 707/224-5197
e-mail: support@inertiabev.com
website: www.inertiabev.com

CASTORO BOTTLING COMPANY

Since 1989, Castoro Bottling has served wineries throughout California with a fleet of high-tech mobile bottling lines. The demand for Castoro Bottling's timely, professional, and knowledgeable service has triggered the bottling of over 60 million bottles of wine with natural cork, synthetic corks, and screwcaps.

Castoro Bottling offers four technologically-advanced mobile bottling lines that arrive on your schedule to serve all your bottling needs. Castoro Bottling can bottle up to 2,500 cases per day, serving any size winery. Custom services include labeling and packaging consultation. Recognizing the need for wineries to offer alternative closures, Castoro Bottling has outfitted two bottling lines with **screwcap** capabilities.

CASTORO BOTTLING CO. CBC FILLING YOUR NEEDS

"Our investment in the best equipment and the best people to run that equipment is what sets Castoro Bottling apart," says Niels Udsen. "We anticipate the needs of a winery better than any other bottler simply because I have owned and operated a successful winery for nearly 25 years. Castoro Bottling is a partner who knows and understands your business."

Since 2005, Castoro Bottling Company has offered Velcorin dosing. Please call, or visit www.castorobottling.com for more information.

For more information, contact:
Castoro Bottling Company
Niels Udsen
PO Box 954, Templeton, CA 93465
tel: 805/467-2002; fax: 805/467-2004
e-mail: Niels@castorobottling.com
website: www.castorobottling.com

PLEASE SEE CASTORO BOTTLING AD, PAGE 17.

AMERICAN AGCREDIT

American AgCredit has meant "money for agriculture" for over 90 years and, in that time, has grown to be the nation's fifth largest Farm Credit Association by focusing on the unique needs and cycles of growers and producers.

Headquartered in the heart of California wine country, American AgCredit has provided wine industry financing for more than 30 years, funding in excess of one billion dollars in vineyard and winery loans.

An active participant in the wine community, American AgCredit is a member and/or supporter of Sonoma County Wineries Association, Napa Valley Vintners Association, California Association of Wine Grape Growers, Wine Institute, Wine Market Council, American Vineyard Grape Exposition, and the Unified Wine & Grape Symposium.

Through good vintages and bad, American AgCredit is there to finance:

- Real estate loans;
- Vineyard development;
- Winery construction;
- Facilities improvement;
- Equipment, barrel, and tank leasing;
- Operating lines of credit for crops and wine inventory.

In an industry defined by variables, American AgCredit is a constant you can depend on for customized financing, flexible terms, and competitive rates for your winery or vineyard needs.

For more information, contact:
American AgCredit
200 Concourse Blvd., Santa Rosa, CA 95403
tel: 707/545-1200; fax: 707/545-9400
e-mail: tlindley@agloan.com
website: www.agloan.com

PLEASE SEE AMERICAN AGCREDIT AD, PAGE 7.

TURRENTINE BROKERAGE

For more than 30 years, Turrentine Brokerage has developed an unparalleled record of predicting wine business trends and helping clients to profit from them. If you deal with wine and grape supplies, if you need to buy or sell grapes or wines in bulk, you need Turrentine Brokerage.

TURRENTINE
GRAPES & WINE

Call Turrentine Brokerage for win/win negotiations, personal service, and a comprehensive selection of premium wines and grapes. A UC Davis-educated winemaker and a Fresno State-educated viticulturist are on staff.

Ask about the **Turrentine Collateral Value Report**, inventory appraisal service, and the often-quoted **Market Update** newsletter for in-depth analysis of the grape and wine markets.

For more information on premium grapes and wines in bulk, processing contracts, pre-season wine and juice contracts, and sales of bottled inventory, contact:

Turrentine Brokerage
Steve Fredricks, Vice President, Partner
Michael Robichaud, Broker, Partner
Brian Clements, Senior Partner
Erica Moyer, Broker
Matt Turrentine, Broker
Larry Kavanagh, Broker
Steve Robertson, Vice President, Managing Partner
Bill Turrentine, President, Partner
7599 Redwood Blvd., Ste. 103
Novato, CA 94945
tel: 415/209-9463; fax: 415/209-0079
e-mail: info@turrentinebrokerage.com
website: www.turrentinebrokerage.com

PLEASE SEE TURRENTINE BROKERAGE AD, PAGE 17.

GOVERNMENT LIAISON SERVICES, INC.

Government Liaison Services (GLS) was founded in Washington, D.C. in 1957 to provide businesses with access to Federal Government offices and the vast amount of information available there.

Today, GLS has a large staff of experts trained in various areas, including intellectual property research, and food and beverage labeling and compliance. All associates are college graduates whose average experience exceeds 20 years.

For over 50 years, GLS has obtained TTB (formerly BATF) label approvals along with pursuing rulings on formula submissions, lab analysis results, advertising, and many other TTB matters for thousands of clients, including wineries, law firms, sole practitioners, Fortune 500 companies, and smaller-sized businesses throughout the U.S. and the world.

GLS also specializes in performing trademark, patent, and copyright search services and is the only major trademark search firm that routinely searches both a computerized database of Federal trademark records, and records from the U.S. Patent and Trademark Office's library, including all "24-hour box" records.

The GLS standard turnaround time for trademark searches is 48 hours. The firm's location in Arlington, VA allows first-hand consultation and guidance from U.S. Patent and Trademark Office officials.

For more information, contact:
Government Liaison Services, Inc.
200 N. Glebe Rd., Ste. 321
Arlington, VA 22203
tel: 800/642-6564, or
703/524-8200 outside U.S.
fax: 703/525-8451
website: www.trademarkinfo.com

PLEASE SEE GOVERNMENT LIAISON SERVICES AD, PAGE 53.

KENNEDY/JENKS CONSULTANTS

Kennedy/Jenks Consultants has provided consulting engineering services to the wine industry for more than 40 years. They specialize in:

- Planning, design, and construction management for facility improvements and expansions;
- Wastewater treatment and disposal systems;
- Water quality and supply;
- Water reuse and recycling;
- Waste minimization and source reduction;
- and storm water management.

Kennedy/Jenks Consultants
Engineers & Scientists

Kennedy/Jenks' approach incorporates a thorough understanding of current regulatory constraints and trends that can have a significant impact on winery activities. Leveraging experience gained in designing systems for large and small winery facilities in California and the northwest, Kennedy/Jenks can identify the most favorable, cost-effective alternatives to meet the needs of your facility.

Kennedy/Jenks has conducted research for the Wine Institute to characterize typical process water waste streams within wineries and identify options for waste minimization and source reduction; these steps can reduce the volume and strength of process water generated and associated treatment costs. Previous research for the Wine Institute focused on defining best management practices for land application of process wastewater.

The Kennedy/Jenks' goal is to provide lasting solutions that integrate effectively with winery operations, address regulatory concerns, and minimize startup and operational costs.

For more information, contact:
Kennedy/Jenks Consultants
Bob Chrobak, Vice President
tel: 415/243-2524; fax 415/896-0999

PLEASE SEE KENNEDY/JENKS CONSULTANTS AD, PAGE 48.

CRAIG ROOT & ASSOCIATES — TASTING ROOM CONSULTING

Craig Root & Associates offers cost-effective opportunities to increase profits and enhance the visitor experience in your visitor center. An entertaining and informative visit to a visitor center stays in the consumer's mind long after expensive advertising has faded.

The company's partial client list includes: Acacia Winery, Clos Pegase Winery, DeLoach Vineyards, Domaine Carneros, Heitz Wine Cellars, Indian Springs Winery, Fess Parker Winery, Franciscan Vineyards, Freemark Abbey Winery, Kendall-Jackson Vineyards, Kenwood Vineyards, Roederer Estate, V. Sattui Winery, St. Clement Vineyards, Stag's Leap Wine Cellars, Zaca Mesa Winery, Niebaum-Coppola Winery, and Robert Mondavi Winery.

Craig Root's consulting services cover several areas of visitor center performance:

1. Complete visitor center start-up (design review, business plan, income/expense projections, tour creation, trade relations, and complete retail room organization).
2. Appraisal of current operations (through direct consulting and/or a "mystery audit" program) to cover all phases listed in #1. Helping staff develop strategies for more effective tour guide skills, such as voice and delivery — through videotape assessment.
3. Direct mail programs (from start-up to fine-tuning an existing program).
4. Trade relations: How to achieve better results with VIP buyers.
5. Seminars designed to improve management and staff performance (**Management seminar** presented at U.C. Davis and Cornell University, **Sales and Customer Service** for staff, and more).

Root teaches a class at U.C. Davis on Tasting Room Design and Management.

For more information, contact:
Craig Root & Associates
Visitor Management Resources
10 Upland Rd., St. Helena, CA 94574
tel: 707/963-7589; fax: 707/963-6009

RENEWABLE TECHNOLOGIES, INC.

Renewable Technologies, Inc. (RTI) has been an industry leader, providing solar electric solutions for vineyards and wineries looking to manage their cash flow and add a sustainable aspect to their vision of business. RTI can provide the details specific to your renewable energy project, including rebates, tax incentives, funding, and construction costs.

RENEWABLE TECHNOLOGIES INCORPORATED
· THE FUTURE OF ENERGY ·

RTI'S in-house engineering team provides unique solutions for each client's needs, including roof-mounted, rack-mounted in the vineyards, or custom solar support structures that provide shaded parking.

Darryl Conklin, president of RTI, notes that wine industry leaders embrace sustainable farming and business practices that showcase to others the true nature of corporate responsibility. They also recognize the economic and public relations value of adding a Solarstar™ Electrical Energy System to their facility.

Lee and Shirley Sobon (Shenandoah Vineyards, Plymouth, CA) are very satisfied with the design, installation quality, and production of the Solarstar™ Electrical Energy System installed by RTI in 2007.

After a comprehensive Energy Audit and Energy Site Survey, RTI combined the latest principles of energy conservation, energy efficiency, and meter consolidation to engineer an appropriately sized Solarstar™ Electrical System for Shenandoah Vineyards.

RTI provides turnkey vineyard and winery solar photovoltaic installations. Please call to discuss *your* vision, and to schedule a site survey and economic analysis.

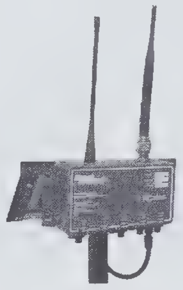
For more information, contact:
Renewable Technologies, Inc.
PO Box 1569, 11851 Fibreform Rd.
Sutter Creek, CA 95685
tel: 209/223-3002
e-mail: sales@renewable.com

PLEASE SEE RENEWABLE TECHNOLOGIES AD, PAGE 13.

RANCH SYSTEMS LLC

Ranch Systems provides real-time, online soil and climate data monitoring, and remote valve activation for single or multi-ranch irrigation scheduling and weather monitoring.

Ranch Systems' wireless mesh networking telemetry equipment and online software interacts with a variety of sensors to gather and transmit vineyard information to a secure website. Customers can view charts, set custom alerts and triggers, generate reports, and activate irrigation valves and equipment online, or download information to a spreadsheet for their own calculations.



In 2007, Ranch Systems is offering a "buy-back" on older telemetry systems, such as Adcon or Automata, when customers upgrade to Ranch Systems' next generation telemetry solutions.

"We constantly hear from large vineyard operators that they are suffering from poor performance of older and costly telemetry systems and are eager for an alternative. With the current buy-back, we make it easier to upgrade to our reliable, cost-effective mesh telemetry," states Jacob Christfort, President of Ranch Systems.

Ranch Systems' solutions work with a range of soil moisture sensors including C-Probes™ and AquaSpy™, and a variety of climate sensors including temperature, relative humidity, wind speed and direction, and rainfall. The wireless nodes and weather stations are modular and require zero-programming for flexible and cost-effective coverage of multiple blocks or properties.

For more information, contact:
Ranch Systems LLC
885 Olive Ave., Ste. A, Novato, CA 94945
tel: 415/898-5900
website: www.ranchsystems.com

PLEASE SEE RANCH SYSTEMS AD, PAGE 60.

NORDBY CONSTRUCTION COMPANY, INC.

Nordby Construction celebrates 30 years of success in the North Bay construction industry in 2006 under the leadership of Del and Craig Nordby – a new generation of owners within the family-owned business. Del and Craig took over from Wendell Nordby, who retired January 1 to pursue other community interests. Nordby Construction's existing experienced management team remains in place under the new owners.

Del and Craig manage the business and have significantly grown three other divisions — Nordby Wine Caves, Nordby Professional Services, and Nordby Signature Homes.

CONSTRUCTION SERVICES

NORDBY
CONSTRUCTION

Nordby Construction builds innovative quality projects in the hospitality, winery, non-profit, commercial, technical, and multi-unit housing private sectors throughout California.

Nordby Construction is widely known for the professionalism and thoroughness of its construction services. The in-depth planning from the pre-construction process through construction execution, ensures projects built on-schedule and on-budget. Nordby's skilled builders, both in the field and in the office, are passionate about what they do and bring best practices and enthusiasm to every job.

For more information, contact:
Nordby Construction Company, Inc.
Craig Nordby, Vice President
1550 Airport Blvd., Ste. 201
Santa Rosa, CA 95403
tel: 707/526-4500; fax: 707/568-4035
e-mail: craignordby@nordby.net
website: www.nordby.net

PLEASE SEE NORDBY CONSTRUCTION AD, PAGE 84.

EXCHANGE BANK

Exchange Bank's Commercial Banking team of experienced lenders understand the unique needs of the wine business. From growing young vines to producing fine wines, they finance it all. The Bank's internal lending capacity and experienced staff enable it to meet the growing credit needs of wineries and growers throughout the North Coast.

EB EXCHANGE BANK SINCE 1890

The Commercial Banking team works with each individual client to determine which products and services will work best for their unique situations. They often partner with **Dumac Leasing**, a Division of Exchange Bank, which offers equipment financing for wineries and other businesses.

Recognized as the Best Business Bank, and Best Company to Do Business With in the North Bay, Exchange Bank lives up to high standards of customer service.

When Exchange Bank is your lender, expect fast, local decisions, flexible terms, and 117 years of experience.

For more information, contact:
Exchange Bank, Member FDIC
Steve Herron, SVP Commercial Banking Manager
tel: 707/524-3102
web: www.exchangebank.com

PLEASE SEE EXCHANGE BANK AD, PAGE 15.

EI SOLUTIONS

"We just had the sense that EI Solutions would pay the same attention to detail that we do in our winemaking and result in the same high-quality product," says Peter Seghesio, CEO, Seghesio Winery (Healdsburg, CA).

EI Solutions (EIS) knows that the value of solar energy to the wine industry lies in both the financial and environmental details. EIS understands that an integrated approach to energy use and management is essential to the economic and environmental sustainability of the wine industry. EIS works with energy and water process efficiency experts to maximize the impact of your investment on your financial and environmental bottom line.

EI Solutions is dedicated to making solar energy cost-effective for the wine industry. EIS offers financing packages and power-purchase agreements that allow customers to completely avoid the upfront capital cost of a solar array. Instead, EIS installs, owns, and operates the system, and then sells the clean solar power to customers at rates below the utility.

The operations, local climate, and sites of EIS clients are all unique. EIS gives them the solution they need to produce clean, cost-effective solar energy that repays their investment from the first day of use.

EI Solutions
Sara Hammes, Director of Marketing
2171 Francisco Blvd. E, Ste. H
San Rafael, CA 94901
tel: 800/237-0916; fax: 800/237-0918
e-mail: sara@eispv.com

PLEASE SEE EI SOLUTIONS AD, PAGE 6

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P.O. Box 3629
San Rafael, CA 94912-9830

PRACTICAL
WINERY & VINEYARD

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58-D Paul Dr. San Rafael, CA 94903
Phone: 415/479-5819 Fax: 415/492-9325

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Card Number: Expiration Date: Security Code:

Billing address for credit card:

Telephone: Customer Signature:

PWV BOOKSHELF

USE THE BOOK ORDER FORM IN THIS ISSUE • Your wine books promptly shipped from one source.

Chemical Analysis of Grapes & Wine: Techniques & Concepts (2004)
P. Iland, N. Bruer, G. Edwards, S. Weeks & E. Wilkes
Comprehensive theory and practice of major chemical analyses of grape and wine.
115pp—$115.00

Cooperage for Winemakers
Geoffrey Schahinger, Bryce Rankine
Manual on construction, maintenance, and use of oak barrels. User-friendly, informative text and photos **112pp—$30.00**

Diseases and Pests
edited by Nicholas, Margarey, Watchel
Dept. of Primary Industries & Resources, South Australia **106pp—$40.00**

Diseases, Pests, & Grape Disorders Field Guide
Magarey, MacGregor, Wachtel, & Kelly
Sturdy, laminated, pocket-sized guide containing more than 350 color photos with short, easily-read descriptions of most diseases, pests, and disorders found in vineyards.
107pp—$30.00

Flowering and Fruitset in Grapevines
Peter May
How weather affects fruitset. Published by Phylloxera and Grape Industry Board of South Australia. **120pp—$30.00**

Growing Quality Grapes to Winery Specifications by M. Kristic, G. Moulds, B. Panagiotopoulos, & S. West
Quality measurement and management options for grapegrowers. **103pp—$35.00**

Illustrated Guide to Microbes and Sediments in Wine, Beer and Juice/
Dr. Charles G. Edwards
125 color photographs showing over 30 different species of yeast, bacteria and mold commonly found in wines, as well as frequently encountered sediments.
126pp—$125.00

Micro Vinification
M.R. Dharmadhikari & K.L. Wilker
A practical guide for home winemakers, commercial small-scale producers, and large wineries making small, experimental lots of table wine.
145pp—$30.00

Microbiological Analysis of Grapes and Wine: Techniques and Concepts
P. Iland, P. Grbin, M. Grinbergs, L. Schmidtke, & A. Soden
An introduction to microbiology in winemaking; serves as a resource for lab personnel and winemakers
120pp—$120.00

A
Zinfandel
ODYSSEY

100 interviews with
Zinfandel growers
and producers throughout
California and Mexico.
450 pages including photos
Edited and published by ***PWV***
ONLY
$39.00

Monitoring the Winemaking Process from Grapes to Wine: Techniques and Concepts by P. Iland, N. Bruer, A. Ewart, A. Markides & J. Sitters
Concepts, tests and techniques used by winemakers throughout the winemaking process for wine style and quality control.
115pp—$115.00

Soil, Irrigation & Nutrition P. Nicholas
Describe vineyard soil types, how to manage soil treatments, cover crops, and herbicides, optimize water quality, irrigation systems. Nutrient deficiencies and toxicities, how to manage nutritional requirements. **201pp—$55.00**

Sunlight into Wine
R. Smart & M. Robinson
Canopy management and economics, improvement of canopy microclimates, importance of winegrape canopies, construction of trellis systems.
88pp—$40.00

Taming the SCREW:
A manual for winemaking with screwcaps
Tyson Stelzer
Detailed technical discussion of screwcaps and the bottle, reasons for choosing screwcaps, winemaking procedures, chemistry, bottling, capping, handling, storage, and ageing. **305pp—$90.00**

Vineyard Simple Tom Powers
Provides a clear outline with diagrams and color photos on how to build and maintain your own vineyard. **118pp—$20.00**

Viticulture, Vol. I, Resources in Australia
2nd Edition
B.G. Coombe & P.R. Dry
With worldwide application. Soils, climates, grapevine classifications, grape varieties, phenology, rootstocks, planting material, vineyard site selection, and grape berry development.
211pp—$60.00

Viticulture, Vol. II, Practices in Australia
B.G. Coombe & P.R. Dry
Grapevine propagation, vineyard establishment, pruning, canopy management, irrigation, grapevine nutrition, grape pests, disease, and protection.
384pp—$60.00

Viticulture & Environment
John Gladstones
Site, variety, and cultural practices. Climatic analysis of Australian and world viticultural areas, new viticultural sites and possible changes in the climatic conditions.
310pp—$45.00

Winegrape Berry Sensory Assessment in Australia
E. Winter, J. Whiting, J. Rousseau
How to examine berries before harvest with 20 standardized and industry-tested criteria, by judging stems, skins, pulp, and seeds.
64pp—$30.00

Wine Grape Varieties in California
edited by P. Christensen, N. Dokoozlian, M.A. Walker, & J. Wolpert
Guide to growers and vintners making decisions about variety plantings and growing practices.
190pp—$30.00

Wine Grower's Guide
Philip M. Wagner
Since publication in 1996, the best selling practical, how-to-grow-winegrapes guide. Covers all aspects and regional variations of North American grape growing. French-American hybrids and *vinifera* are covered.
228pp—$20.00

Wine Marketing & Sales: Success Strategies for a Saturated Market
L. Thach, J. Olsen, & Paul Wagner
Comprehensive text provides in-depth, hands-on approach to wine marketing and sales.
323pp—$69.95

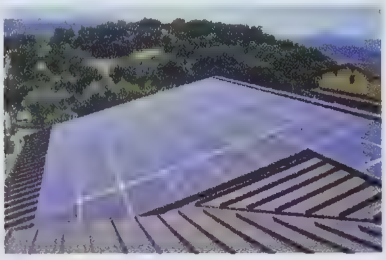
Winery Planning & Design
Bruce Zoecklein, Virginia Tech
200pp in outline format CD—$95.00

Winery Utilities Planning, Design, and Operation David Storm
Describes major components of winery utility systems for planning, design, and operation.
550pp—$120.00

Winery Wastewater Handbook: Production, Impacts, and Management
J. Chapman, P. Baker, & S. Wills
Examines the chemical nature of wastewater, its impacts, how it can be handled efficiently, and disposed of responsibly. **128pp—$25.00**

PREMIER POWER RENEWABLE ENERGY, INC.

The dedicated Premier Power team is passionate about the environment, and believes that by producing clean, green energy with solar there is a better way to enjoy life, both environmentally and financially.



Premier Power specializes in both business and residence installations. Utilizing a turn-key approach, quality workmanship, and high professional standards, every project is unique and every solar system is designed to meet specific needs. With the exceptional "Zero Defect" quality assurance program, a dedicated team of talented project managers, electricians, and engineers strive to make customer satisfaction the top priority; 98% of their customers answered YES when asked if they would recommend Premier Power to their friends and relatives.

When it came to solar, these fine wineries and vineyards chose Premier Power: Shafer Vineyards, Chateau Montelena, Spottswoode Estate Vineyard & Winery, Silverado Vineyards, Larkmead Vineyards, Madrona Vineyards, Terre Rouge Wines, and L'Aventure. Why not join them and start helping both the environment and your bottom line today!

With the Flex-Fit Plan, you can enjoy all the benefits of solar with a zero capital investment, allowing you to hedge against future electric rate increases.

For more information, contact:

Premier Power Renewable Energy, Inc.
4961 Windplay Dr., Ste. 100
El Dorado Hills, CA 95762
tel: 877/939-0400
e-mail: info@premierpower.com
website: www.premierpower.com

PLEASE SEE PREMIER POWER AD, PAGE 25.

ETS LABORATORIES

ETS Laboratories is one of the most advanced analytical wine laboratories in the world. With four locations in California, Oregon, and Washington, ETS offers wineries and suppliers access to the most modern and technically-demanding analytical methods available in the wine industry. ETS was the first independent wine laboratory accredited by the American Association for Laboratory Accreditation to ISO 17025 quality standards.

ETS provides a range of analytical services for grape and wine development through harvest, winemaking, aging, and bottling quality control. ETS continues to introduce new analytical programs for wine and juice spoilage organisms based on real-time genetic detection and PCR replication. ETS is the sole US licensee of this molecular technology with applications for the wine industry.

ETS continues to meet and exceed the wine industry's analytical needs by providing the highest standards of analytical data, quality assurance, customer service, and client confidentiality. ETS offers courier "pick–up" services in Napa and Sonoma counties, and a convenient night drop box for after-hours samples. Most test results are available within 24 hours.

For more information, contact:

ETS Laboratories (California)
899 Adams St., Ste. A, St. Helena, CA 94574
tel: 707/963-4806; fax: 707/963-1054
ETS Laboratories (Central Coast)
1972 Hobson Ave., Greenfield CA 93927
tel: 831/385-3437; fax: 831/385-5187
ETS Laboratories (Oregon)
1819 NE Baker St., McMinnville OR 97128
tel: 503/472-5149; fax: 503/217-0668
ETS Laboratories (Washington)
3020 Isaacs Ave., Walla Walla, WA 99362
tel: 509/524-5182; fax: 509/526-8053
e-mail: info@etslabs.com
web: www.etslabs.com

PLEASE SEE ETS LABORATORIES AD, PAGE 58.

ELYPSIS, INC.

Elypsis Winery Solutions provides a complete software package exclusively for the wine industry. This solution provides powerful functionality allowing you to automate, "everything after the wine hits the bottle." Combining tasting room, wine club, and web sales with wholesale, allocations, depletions, and distribution, customers gain immediate insight into winery performance and financial health.

E-Winery™, a business software solution developed by Elypsis, runs on the Microsoft Dynamics-NAV® platform. It offers wineries the ability to operate from a single database, eliminating software incompatibility and headaches. E-Winery can help organize all aspects of winery operations including GL, AP/AR, payroll, order management, remote order entry, allocations, depletions, trade account management, and contact management.

Elypsis Inc. ®

WineClub Manager™ is fully integrated into Microsoft Retail Management System® POS. It adds the ability to track, maintain, process, and effortlessly ship an unlimited number of wine club orders. Features include: a single database for order history, seamless credit card processing; unlimited sales tax updating, and efficient mail merge features for order fulfillment.

Elypsis, a Microsoft-Gold Certified Partner, has been providing software products and consulting services to Napa Valley businesses since 1987. Using a combination of Microsoft Dynamic and Retail Management products and winery-specific modules, Elypsis has focused on providing software to the wine industry.

Elypsis references and case studies tell the story of a leader in total software solutions for wineries.

For more information, contact:

Elypsis, Inc.
1957 Sierra Ave., Napa, CA 94558
tel: 707-257-8912
web: www.elypsis.com

PLEASE SEE ELYPSIS AD, PAGE 36.

LESCURE ENGINEERS, INC.

Lescure Engineers, Inc., founded in 1979, provides integrated professional services including project planning, land surveying, and civil engineering, to offer a unique, comprehensive, and practical approach to winery and vineyard development.

Experienced engineers and surveyors provide responsive project management services in coordination with the client's architects and contractors. Multi-disciplinary technicians provide project continuity from topographic mapping, design and plan preparation, to construction staking. Project managers provide construction-phase services including bidding assistance and construction observations.

Services provided for winery and vineyard development projects include:

- Use permit applications;
- Subdivision and lot line adjustment;
- Topographic surveying;
- Boundary surveying;
- Site improvement plans;
- Grading, drainage, and erosion control;
- Retaining wall design;
- Private driveway and bridge plans;
- Water rights applications;
- Reservoir and dam design;
- Water supply and delivery systems;
- Wastewater management systems.

LESCURE
ENGINEERS, INC

Lescure Engineers has developed a reputation for innovative wastewater collection, treatment, and dispersal engineering. Project managers stay abreast of current technology by attending seminars and conferences, and participating in industry associations. Lescure Engineers' design approach avoids a "one-size-fits-all" outcome. Instead, alternatives are analyzed to arrive at a wastewater management system best suited for site conditions and winery operations.

For more information, contact:
Lescure Engineers, Inc.
4635 Old Redwood Hwy.
Santa Rosa, CA 95403
tel: 707/575-3427; fax: 707/542-2353
e-mail: le@lescure-engineers.com
website: www.lescure.biz

THE PERSONNEL PERSPECTIVE

Celebrating 20 years in business, The Personnel Perspective has provided wine industry clients with comprehensive recruitment services to ensure hiring the right person for the right winery. This mission is accomplished by leveraging their recruitment expertise, wine industry experience, and strategic human resources knowledge to match the right person that will thrive in the client's unique culture.

The Personnel Perspective specializes in working with the opportunities and challenges distinctive to the wine industry. Their recruiting specialists approach the process through a series of actions such as:

- Developing a candidate profile and sourcing strategy;
- Accessing their extensive database of qualified professionals;
- Conducting skill-based and behavioral assessments of candidates;
- Presenting the "best of the best" candidates for consideration;
- Conducting salary negotiations and preparation of legally-compliant offer letters;
- Performing thorough reference and background checks;
- Designing compensation plans including bonus and incentives.

The Personnel Perspective's recruitment services save you time and money based on their formula for matching the right person to the right winery and high retention rate. Additional benefits include choosing from high-caliber, pre-qualified candidates and personal attention to your specific goals and vision.

Finding the right people is only the first step for building a successful organization. The Personnel Perspective, an expert single-source provider with in-depth knowledge of recruitment, compensation, human resources, and management, is positioned to help you grow your business with innovative solutions to your staffing needs.

For more information contact:
The Personnel Perspective
Jay Manriquez, Marketing Manager
575 W. College Ave., Santa Rosa, CA 95401
tel: 707/576-7653
website: www.personnelperspective.com

PLEASE SEE PERSONNEL PERSPECTIVE AD, PAGE 43.

SCION ADVISORS

Scion's team of advisors works alongside winery leadership to navigate critical business transitions, achieving higher levels of performance and long-lasting results. Scion Advisors are passionate about finding creative solutions to a winery's toughest problems and implementing solid practices that support distinctive family goals, values, and vision.

Seasoned executives, Scion's partners combine a unique perspective of the wine business with general management know-how. Scion Advisors ask the tough questions, and drive the big decisions on strategy, organization, and operations. By sharing extensive management experience and transferring knowledge and capacities, Scion Advisors helps build valuable family wine businesses.

Scion Advisors

Scion Advisors has helped more than 50 wine industry clients to develop new sources of profitable growth, reposition their businesses for the future, sharpen their competitive advantage, and manage family business succession.

Scion Advisors: Building stronger businesses for future generations.

For more information, contact:
Scion Advisors
1339 Pearl St., Suite 204, Napa, CA 94559
tel: 707/258-9130; fax: 707/258-9132
e-mail: deborah@scionadvisors.com
website: www.scionadvisors.com

PAIGE POULOS COMMUNICATIONS

One of the strongest teams in wine industry public relations, Paige Poulos Communications is renowned for its creativity, its drive, and its bottom-line return on communications investments.

The agency's range of services spans every aspect of business and direct-to-consumer interaction, from events to media relations, wine club and direct sales program development, creation of meaningful sales tools, multi-media presentations, and more.

In 2006, the agency introduced the *PPC PR Audit* program, which evaluates a winery or wine industry supplier's target audiences, communication strategies, website, news releases, media and sales kits, and collateral. The *PPC PR Audit* provides insights into program effectiveness and makes recommendations for advancing or changing programs to reach stated goals.

Paige Poulos Communications is a service firm to wine and luxury spirits producers, distributors, media, and legal, financial, and other service providers to the wine industry.

For more information contact:
Paige Poulos Communications
Winehaven Place
64-70 Railroad Ave.
Pt. Richmond, CA 94801-3923
tel: 510/970-9777; toll-free: 800/497-3376
e-mail: info@paigepoulos.com
website: paigepoulos.com

PLEASE SEE PAIGE POULOS COMMUNICATIONS AD, PAGE 32.

HANSEL LEASING, INC.

For over 45 years, Hansel Leasing has been a premier source for leasing. Hansel Leasing continues as a full-service leasing company; providing leases for new and used vehicles and equipment. Every lease is customized to suit the specific needs of the client.

Hansel Leasing knows the wine business. Stephen E. Hansel, president of Hansel Leasing, is owner/winemaker of Walter Hansel Winery in Santa Rosa, CA. His hands-on experience and knowledge have been instrumental in making the company what it is today — a leading leasing resource for the wine industry.

HANSEL LEASING

We Lease Everything!

As a direct lender, Hansel Leasing's professionals are able to make credit decisions, create documents, and pay vendors in a timely manner. The staff's goal is to make every transaction simple and convenient for clients and their suppliers.

Hansel Leasing can provide lease-financing for your winery. The lease portfolio includes: crushers, presses, bottling lines, stainless steel tanks, oak wine barrels, refrigeration systems, barrel racks, vineyard wind machines, sorting tables, forklifts, tractors, seeders, and sprayers.

Want to lease something not on the list? Call Hansel Leasing—they lease everything.

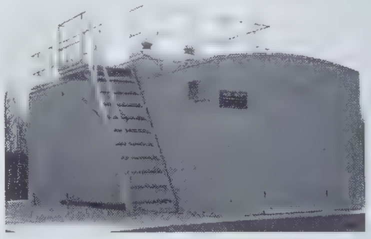
For more information, contact:
Hansel Leasing, Inc.
Jim Taylor, Lease Manager
PO Box 3437, Santa Rosa, CA 95402
tel: 707/544-2822; fax: 707/578-8306

PLEASE SEE HANSEL LEASING AD, PAGE 44.

ADI SYSTEMS INC.

ADI Systems Inc. specializes in industrial wastewater treatment and can offer a number of solutions for wineries, from treatment to water reuse. ADI has installed hundreds of systems worldwide, including nearly 20 wineries and over 50 breweries, distilleries, and alcoholic beverage production facilities for clients like Anheuser-Busch, Coors Brewing, Guinness, and Baileys.

- **ADI-MBR (Membrane Bioreactor)** — A membrane bioreactor (MBR) system, based on the world's leading MBR technology, can produce reuse-quality water within an easy-to-operate, small-footprint package. Effluent from the ADI-MBR will meet the strictest discharge requirements and offers wineries a variety of disposal options including irrigation, aquifer recharge, or direct discharge. This technology has been utilized in nearly 20 wineries worldwide.



- **Anaerobic Technologies** — For large wineries, ADI offers anaerobic systems that are ideally suited to treating the high-strength wastewater generated at wineries and provide an efficient, economical solution to wastewater problems. Wineries can recover the biogas generated in these systems and use it to displace electricity or natural gas use, thus providing an additional economic benefit.

Contact an ADI wastewater treatment specialist today and explore a variety of solutions to handle the wastewater treatment needs at your winery and improve the overall bottom line.

For more information, contact:
ADI Systems Inc.
Al Cocci, Vice President
182 Main St., Unit 6, Salem, NH 03079
tel: 800/561-2831 (US and Canada) or
603/893-2134; fax: 603/898-3991
e-mail: systems@adi.ca
website: www.adisystemsinc.com

PLEASE SEE ADI SYSTEMS INC AD, PAGE 16.

VINQUIRY, INC.

Vinquiry provides analytical services, winemaking products, sensory services, and enological consulting to the wine industry.

In order to make these services widely available, Vinquiry has four locations. The new Paso Robles office will expand to meet the needs of the customers in that area, while the offices in Sonoma County, Napa County, and Santa Maria continue to offer personalized and expert service for every customer.

- Vinquiry is now offering the new Adams Assay, which quantitatively measures certain functional classes of phenolics. The Adams Assay will help wineries evaluate the effective phenolic changes during various trials, compare appellations and vineyards, and define wine style from past vintages.
- PCR is an exciting, new method for the detection of *Brettanomyces* and bacteria. Results from the PCR method are available in hours, as opposed to a full week with traditional plating methods.

VINQUIRY

- Vinquiry now provides rapid analysis for the detection and measurement of *Botrytis*. Using the equipment manufactured by Envirologix, Vinquiry offers *Botrytis* analysis as part of its comprehensive Juice Panel or as a stand-alone test.

Along with the newer tests, Vinquiry offers basic wine analysis to assist winemakers in achieving their goals.

For more information, contact:
Vinquiry, Inc.
7795 Bell Rd., Windsor, CA 95492
tel: 707/838-6312; fax: 707/838-1765
e-mail: info@vinquiry.com
website: www.vinquiry.com

PLEASE SEE VINQUIRY AD, PAGE 40.

WINEWEB ENTERPRISES, INC.

WineWeb® provides a suite of cost-effective services for wineries, including websites, e-commerce sales processing, and e-Marketplace promotion services.

WineWeb can create and host a unique, effective, and robust website with their content management system, unlimited e-mail accounts, traffic statistics, blog and more. Anytime-access to your content allows website maintenance by non-technical winery staff. Order fulfillment tools, custom data exports, and application integration reduce staff labor requirements.

WineWeb®

WineWeb's online order processing service is customized to the needs of wineries and includes a fully compliant shopping cart, credit card processing, shipping carrier integration, age verification, fulfillment center routing, and order fulfillment tools. The e-commerce service can be integrated into an existing website, and includes both direct-to-consumer and direct-to-trade sales.

WineWeb services can integrate with your other winery applications, and provide tools to manage your online sales channel and customer repository. Advanced features include multiple users, role-based security, event reservations and ticketing, gift certificates, sales dashboard and reporting module, with additional components for wine club member management, email campaigns, and affiliate sales.

Since 1995, WineWeb has been providing cost-effective Internet services to wineries. WineWeb provides small winery value with a large winery feature-set. There is no contract commitment period. WineWeb earns your business each month.

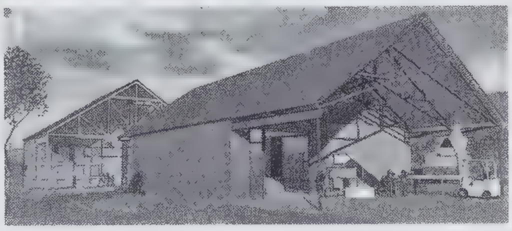
For more information, contact:
WineWeb Enterprises, Inc.
1 Stone Ridge Rd., Santa Fe, NM 87505
tel: 888/236-0058; fax: 888/236-1439
website: services.wineweb.com

BOXWOOD

Wineries each have their own DNA, containing the personalities and lives of the owners, winemakers, viticulturists, and vignerons. It is expressed in the wine they make, the labels on the bottles, and the winery buildings themselves.

Boxwood's collaborative process creates unique sustainable solutions that enhance this "self expression," marrying it with the terroir of the building site. Wine varies with ecology; so should the building where wine is made.

Boxwood's founding Principal, Joe Chauncey is as passionate about wine as he is about architecture. Joe and his wife are proud vintners of limited production Cabernet Sauvignon and Syrah in their own small winery. His first-hand knowledge of the winemaking process informs Boxwood's architectural planning and selection of materials and systems, finishes and lighting.



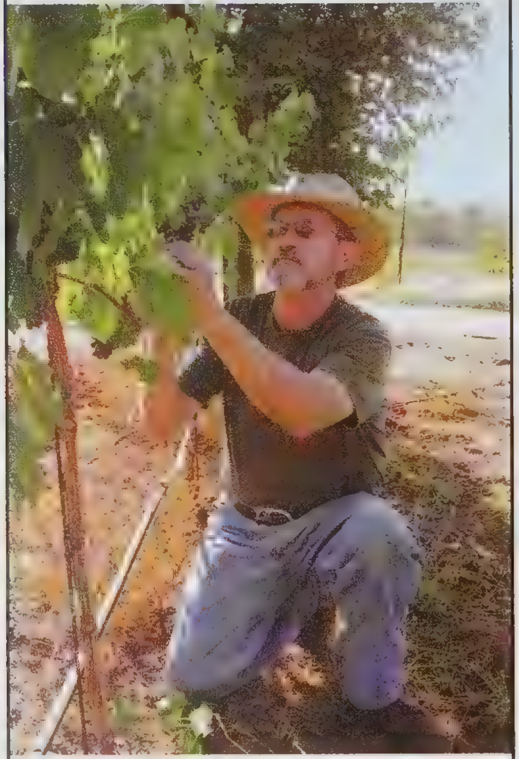
Architecture, like winemaking, is a unique combination of art, pragmatics and science. Boxwood's energy-efficient wineries are infused with natural light and sustainable materials, creating bright, healthy, safe working environments where winemakers thrive.

Boxwood's winery client list includes: Hedges Family Estates (WA), Obelisco (WA), Carlton Winemakers' Studio (OR), Nicholas Cole Cellars (WA), Col Solare (WA), Brian Carter Cellars (WA), Substance (WA), Hightower Cellars (WA), Waters Winery (WA), August Cellars (OR), Reynvaan Family Vineyard (WA), Dundee Winery Condominium (OR).

For more information, contact:
Boxwood
Joe Chauncey
1218 Third Avenue, Ste. 1412
Seattle, WA 98101
tel: 206/343-0236; fax: 206/343-0241
website: www.eboxwood.com

PWV READERS ARE INFORMED PROFESSIONALS

LEON SOBON



Family business. Leon and Shirley Sobon founded Shenandoah Vineyards in 1977, and the second family winery, Sobon Estate, in 1989.Three of their six children work in the wineries and the 125 organically-farmed vineyard acres in Amador County, CA. The wineries produce about 30,000 cases of wine annually.

Our most loyal reader. Sobon has been reading PWV for 28 years!

Why he reads *PWV*:
"PWV is an indispensable source of timely, pertinent and usable information. It should be on the 'must have' list of anyone in the wine and grape business. ***I have every issue ever published***, and it is one of my most used reference sources."

Family goals. Sobon is committed to making top-quality wines using all organic and sustainable practices possible.

PW *Informative, Inspiring, Absolutely Necessary!*

Visit www.practicalwinery.com for more information

DICKENSON, PEATMAN & FOGARTY

Dickenson, Peatman & Fogarty (DP&F) has served the legal needs of the wine industry for over 40 years. DP&F attorneys have built long-term relationships and carved out a unique niche within the wine and legal communities — from their offices in Napa to the established and emerging wine regions throughout the world. DP&F recently opened a Santa Rosa office to serve Sonoma County clients more efficiently.

DP&F

DP&F clients include multinational, family-owned and boutique wineries, wine trade associations, domestic and international investors in the wine business, growers, winemakers, suppliers, consultants, and retailers. Attorney Scott Gerien heads DP&F's Intellectual Property Group, and was named to the top 50 list of U.S. trademark attorneys by *Trademark Insider* magazine in July 2006.

A full-service law firm offering representation in the areas of land use, real estate transactions, ABC/TTB regulation and compliance, labeling matters, trademark and copyright protection, business formation, financing, mergers and acquisitions, leases, grape contracts, litigation, business succession planning, estate and tax planning, and labor and employment, DP&F is a recognized leader in legal matters affecting the wine industry.

For more information, contact:
Dickenson, Peatman & Fogarty
Napa
809 Coombs Street, Napa, CA 94559
tel: 707/252-7122; fax: 707/255-6876
Santa Rosa
50 Courthouse Sq., Santa Rosa, CA 95404
tel: 707/524-7000; fax: 707/546-6800
website: www.dpf-law.com

ASCEND INNOVATIONS INC.

Ascend Innovations assists clients in crafting site-specific civil engineering solutions for challenging applications. Areas of specialty include:
1) Water and wastewater treatment (including winery and municipal applications);
2) Facility planning and permitting;
3) Facility operations and troubleshooting.

With core experience in water resource planning, water systems design, and wastewater recycling alternatives, Ascend Innovations is uniquely suited to add value to a client's resources.

For more information, contact:
Ascend Innovations, Inc.
119 Laurel Pl, Ste. C, San Rafael, CA 94901
tel: 415/459-4433; fax: 415/459-4434
e-mail: glenn@ascendinnovations.com

FRED LYON PICTURES

Get the photography you need, that will tell your story at its best.

Fred Lyon is the wine industry's own photographer. He relentlessly prowls vineyards and wineries around the world. You've seen his pictures in many magazines and wine books.

For wineries and wine marketers, Lyon creates innovative conceptual images for persuasive advertising, press-use, and brochures. These are high-energy images from an experienced photographer who is friendly, rapid, and reliable.

Be sure to visit his website. Plus a fresh new source of available pictures, www.winefoodandtravel.com.

For more information, contact:
Fred Lyon Pictures
3609 Buchanan St., San Francisco, CA 94123
tel: 415/922-5100; fax 415/922-5762
e-mail: fred@fredlyon.com
website: www.fredlyon.com;
www.winefoodandtravel.com

WALLACE GROUP

Wallace Group has built its reputation in part on delivering thoughtful, inventive planning and engineering solutions to the wine industry.

A multi-disciplined approach — combining planning, survey, engineering, design, and construction management — allows Wallace Group to work from conceptual design through construction to provide the essential elements needed in every commercial development.

WALLACE GROUP®

Wallace Group thrives on working with environmentally-sensitive land to create low-impact, sustainable designs and solutions. The most effective and innovative technologies are utilized to manage process wastewater, an abundant by-product of any successful winery.

The use of sustainable, natural treatment systems — Swanson Advanced Integrated Pond Systems (AIPS) and constructed wetlands — paired with traditional mechanical components allow for efficient treatment and reuse or disposal of process wastewater while adhering to Regional Water Quality Control Board regulations.

With services ranging from innovative planning and engineering, to creative landscape design and construction management, Wallace Group can assist in designing a new winery, or improving the operation and design of existing facilities. Wallace Group has the resources and the experience to manage winery projects from start to finish.

For more information, contact:
Wallace Group
612 Clarion Ct., San Luis Obispo, CA 93401
tel: 805/544-4011; fax: 805/544-4294
e-mail: info@wallacegroup.us
website: www.wallacegroup.us

THUNDER MOUNTAIN ENTERPRISES, INC.

Thunder Mountain Enterprises, Inc. (TME) provides comprehensive soil and water management services, including Polymer-Stabilized Road Surfacing™, Topical Polymer Application™ dust control, installation of water containment ponds, installation of erosion and sediment control best management practices, and the restoration of native habitats, landscapes, and streams.

Founder Dave Smiley formed TME to meet the growing needs of land owners, developers, contractors, and industrial facility owners in managing water, soil, and on-site pollutants, and to comply with the tough demands of complex environmental laws on construction projects and agricultural / industrial operations.

TME has developed a unique analytical approach that combines biotechnology, site hydrology, soil science, and advanced erosion control technology with construction savvy and environmental expertise. This approach enables TME to produce quick, reliable design and implementation solutions that can be applied to agriculture, mining, industrial, and commercial construction applications.

For more information, contact:
Thunder Mountain Enterprises, Inc.
James Chinchiolo
PO Box 292821, Sacramento, CA 95829
tel: 888/448-9551; fax 916/381-3750
e-mail: jchinchiolo@tme1.com
website: www.tme1.com

MARIN SOLAR

Envision a world with no pollution, clean air, a balanced environment and abundant and renewable energy. Enter Marin Solar, the award-winning company that helps you *Own Your Power*™. Let Marin Solar demonstrate the intelligence of solar energy and how it can work for you, your life, and your bottom line.

marin solar®
Own Your Power

Marin Solar believes everyone has the right to clean air, clean water, and access to reasonably-priced renewable energy. The company supports this vision by creating affordable, attractive, and efficient photovoltaic power systems to provide customers with the highest quality, best looking, and most competitively-priced solar systems.

Marin Solar was founded in 2002 by Roy Phillips, a general contractor with over nine years experience working with photovoltaic systems and over 25 years building high-end residential projects. Phillips was sold on solar after installing several systems in the course of his regular work, and the results fired his imagination.

Since its inception, Marin Solar has grown exponentially — going from a small crew to a full team of experienced energy consultants, designers, electricians, engineers, and installation specialists. Persistence, attention-to-detail, competitive pricing, satisfied customers, word-of-mouth, and quality work are the reasons Marin Solar is one of the premier full-service solar integrators in the United States.

For more information, contact:
Marin Solar
1163 Francisco Blvd. E., San Rafael, CA 94901
tel: 415/456-2800; fax: 415/456-2855
website: www.marinsolar.com

DAL POGGETTO & COMPANY LLP, CPAs

Dal Poggetto & Company LLP specializes in accounting, tax, and consulting services for privately-held businesses and their owners, with a particular emphasis in the wine industry. The firm's partners have been accountants and consultants since 1975, and have worked with companies of all sizes, from those with annual revenues under $50,000 to those with more than $500 million in annual sales.

The firm's services include profit-improvement studies; strategic planning; financial modeling; transaction consulting for mergers, acquisitions, and divestitures; tax strategies and business planning; and traditional services, such as auditing and accounting, tax planning and preparation, and accounting systems development and consulting.

The staff at Dal Poggetto & Company LLP have extensive wine industry experience and are frequently able to make cost and tax savings recommendations to clients. They have an excellent reputation for clear communication skills, technical abilities, and responsiveness to clients.

The high quality of the firm's practice is maintained by a program of formal technical training for staff that greatly exceeds state licensure requirements and the programs of most other accounting firms. The most current technologies are employed to deliver client service in an efficient and cost-effective manner.

For excellent service at a competitive cost, provided by experienced professionals with broad consulting skills tailored to the needs of the wine industry, contact Dal Poggetto & Company LLP.

For more information, contact:
Dal Poggetto & Company LLP, CPAs
Jon P. Dal Poggetto, CPA
149 Stony Circle, Ste. 100
Santa Rosa, CA 95401
tel: 707/545-3311; fax: 707/525-3999
e-mail: info@dalpoggetto.com
website: www.dalpoggetto.com

LAURENCE FERAR & ASSOCIATES

Established in 1983, Laurence Ferar & Associates is committed to quality architectural and landscape design with a common sense approach to meeting client needs. To research winery design, Laurence Ferar has visited hundreds of facilities in the U.S., France, Spain, Italy, and New Zealand, talking with winemakers about specific challenges and unique solutions.

Like winemaking, winery design is part art, part science, and part economics. Just as *terroir* defines wine character, the unique sense of place inherent to each site is central to Ferar's approach.

A LEED™ accredited professional, Ferar is committed to principles of sustainable development and energy-efficient design.

The firm has broad experience in gravity-flow facilities including: Adelsheim Vineyards (OR), Lemelson Vineyards (OR), Pepper Bridge Winery (WA), and Woollaston Estates (Nelson, New Zealand). Other clients include: Leonetti Cellars (WA), Alloro Winery (OR), Red Mountain Vineyards (WA). Currently in design are projects for Kistler Vineyards and Littorai Wines in Sonoma (CA), Benjamin Bridge and Sandhill wineries in Canada, and Blake Family Vineyards in New Zealand.

Professional services include site evaluation, master planning, integrated building and garden design, and governmental permitting assistance. The firm encourages your inquiries for small or large projects. Laurence Ferar & Associates not only has the expertise to carry out demanding assignments — they share your enthusiasm for winemaking success.

For more information contact:
Laurence Ferar & Associates, Inc.
1016 S W Clay St., Portland, OR 97201
tel: 503/241-5447; fax: 503/241-0826
website: www.ferar.net

CROCHIERE & ASSOCIATES, LLC

Crochiere & Associates, LLC, a package testing and consulting service, offers wineries and wine package suppliers an independent source for the evaluation of bottles, closures, and bag-in-box for sealing reliability and barrier properties under commercial conditions. Filled package methods are used to evaluate leakage, oxygen ingress, carbonation loss, and contamination ingress in order to:

- Develop packaging materials;
- Insure the reliability of the bottle-to-closure seal;
- Determine optimum closing conditions for capping machines;
- Select the right process, packaging and materials to provide a consistent and specific level of oxygen pickup and ingress;
- Trouble-shoot existing packaging problems.

The procedures and methods used have been adapted from those used in the beer, soft drink, and juice industry for decades.

Some examples of projects Crochiere has conducted include:

- Evaluating screw caps from numerous suppliers for the best and most consistent barrier properties, then establishing quality control specifications for closures;
- Evaluating plastic bottles and closures or bags and taps for oxygen ingress and oxygen scavenger useful life;
- Determining which crowns and liners offer the best barrier properties for carbonation loss, and oxygen and TCA ingress during cellar storage;
- Determine how well screw caps or crowns will withstand the abuse of warehouse stacking and damage to the sealing area;
- Design bottle and cap-fit to insure the cap-perform is reliable over the life of the package.

For more information, contact:
Crochiere & Associates, LLC
George K. Crochiere
55 Bancroft St., Pepperell, MA 01463
tel: 978/433-6067
e-mail: crochiere_assoc@hotmail.com

October 30
Napa Valley Wine & Grape Expo
COPIA, Napa, CA

Napa Valley Grapegrowers introduces the first annual Napa Valley Wine & Grape Expo that will offer sessions on important issues relevant to growers, vineyard owners, and wineries, including: 2007 Luxury Wine Market Report, Managing Red Wine Fermentations for Premium Production, Viticultural Updates from Napa County, Using the Adams Tannin Assay, Solar Technology and Federal Rebates, New Approaches to Improving Wine Quality, and a Tasting of Cabernet Sauvignon from 2005 Hang Time Trials.

Both English and Spanish seminars are included and PCA credits will be available for approved topics. Do not miss the industry tradeshow, comprised of suppliers that shape the premium wine industry today. The tradeshow, lunch, and hosted wine bar will provide an excellent opportunity to celebrate and catch up with friends and business partners as harvest comes to a close. Event hours are 8:30 AM–4:00 PM. Location: COPIA — 500 1st Street, Napa. Seminar /tradeshow admission = $10. Please register for seminars in advance by visiting www.napagrowers.org or call the NVG office at 707/944-8311.

November 1–2
Sustainable Ag Expo
Paso Robles Event Center
Paso Robles, CA

THURSDAY, NOVEMBER 1

1 PM Understanding the Complexities of Legal Issues on the Farm: Air Quality and Pesticides — PM-10 Emission Reductions — John Beyer (California Air Quality Coordinator); Intervention to Reduce Take-Home Pesticide Exposure to Farmworkers and Families — Asa Bradman (CHAMACOS, UC Berkeley); California Pesticide Laws / Regulations Update — Representative, SLO Ag Commissioner's Office.

3:30 PM Water Quality and Agriculture: Current Status, Challenges, and Successes — Conditional Ag Waiver for Irrigated Agriculture: Cooperative Water Monitoring Results — Kirk Schmidt, Central Coast Water Quality Preservation, Inc.; Ag Field Practices Effectiveness: Pesticide Transport and Mitigation Measures — Michael Cahn (UCCE); Assessing Pesticide Environmental Risk using Win-PST — Dana Ashford-Kornburger (USDA-NRCS).

5 PM Exhibitors' Showcase with wine and hors d'oeuvres.

FRIDAY, NOVEMBER 2

8 AM Registration, Exhibit Hall Open

9 AM The Evolving Green Consumer — Sustainability in the Marketplace (hot breakfast), Kate Peringer, The Hartman Group.

10 AM Crop-Specific Breakout Seminars for Livestock/Rangeland, Orchards, Row Crops (Vegetables / Strawberries), and Viticulture: Understanding and Managing Cold Damage — Dr. Robert Wample (Department Chair, Viticulture & Enology, CSU Fresno); Impact of Various Weed Control Practices on Weed Communities — Richard Smith (Weed Scientist, UCCE); Managing Marestail — Kurt Hembree (Fresno County Farm Advisor).

Noon Lunch with Key Note Address: Bill Lyons (former Secretary of Agriculture, CDFA).

1:30 PM Concurrent Sessions:

Breakout-1: Reducing Agriculture's Impact & Footprint: Integrated Structures and Energy Biofuels: Opportunities/Challenges for Biological Integration on the Farm — Steve Shaffer (Office of Agriculture &

NAPA VALLEY GRAPEGROWERS
PRESENTS

NAPA VALLEY
WINE ✦ GRAPE
EXPO

TUESDAY,
OCTOBER 30, 2007
8:30 A.M. – 4:00 P.M.
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500 First Street
Napa, CA 94559

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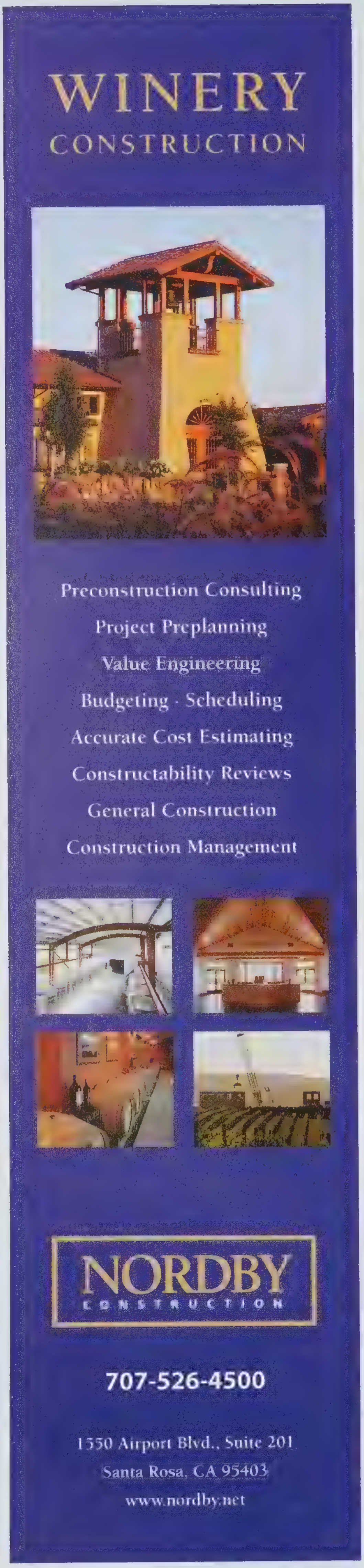
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Environmental Stewardship, CDFA); Grower Testimony: Adopting Biodiesel into Farm Management — Lino Bozzano (Laetitia Vineyard & Winery); Sustainable Buildings from the Ground Up — R. Gary Black (Professor of Architecture, UC Berkeley, and President, Integrated Structures, Inc.).

Breakout-2: Consumer Preferences for Sustainably Produced Food & Wine — July Ackerman (Upstairs Marketing Group), Jan Perez (The Center for Agroecology & Sustainable Food Systems, UCSC).

Breakout-3: Recycling Ag Containers — Ron Perkins (Agriculture Container Recycling Council), Brad Bittleston (Integrated Ag Plastics).

Spanish Breakout: Irrigation: What, When, How (Spanish Only) — Monica Barricarte (Water Resource Specialist, Cachuma RCD).

3 PM Laws & Regulations: Hot Topics in Labor Management — George Daniels (Farm Employer Labor Services), Ron Strochlic (California Institute for Rural Studies), Guadalupe Sandoval (Sandoval Bilingual Safety Solutions).

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December 12–14
Pierce's disease Research Symposium
Westin Horton Plaza Hotel
San Diego, CA

Invited speakers to the seventh annual Pierce's disease Research Symposium include Andrew Walker (UC Davis), to open the Crop Biology and Disease Epidemiology session and Leonard Nunney (UC Riverside), to open the Pathogens session. There will also be a session on Vectors.

The agenda will include presentations and updates of research currently being done around the world, and poster sessions allowing everyone to speak to individual researchers.

Roger Innes (chair of the PD/GWSS Board's Research Scientific Advisory Panel [RSAP]), will give a report. The RSAP has analyzed 145 research projects conducted since the National Academy of Sciences completed its review of the research effort. The report will address key areas of progress, and areas still in need of attention.

For more information, call 916/651-0253. For copies of research progress reports from previous years, or visit the CDFA Web site at www.cdfa.ca.gov/gwss/.

January 29–31, 2008
Unified Wine & Grape Symposium
Sacramento Convention Center
Sacramento, CA

There will be more trade show space than in previous years. Bursting at the seams perhaps best describes the last six years of the Unified Symposium as it has grown to fill the Sacramento Convention Center and spill out into surrounding hotels. For 2008, the organizers have created space for 33 more standard booths.

"We have been exploring ways to make more room for the many small businesses that make up a large sector serving the wine and grape industry," says Karen Ross, president of the California Association of Winegrape Growers, which co-hosts the Unified Symposium with the American Society for Enology & Viticulture. "Adding more space for exhibitors has been a big priority for us for several years, and it is finally happening in 2008."

In the midst of harvesting the 2007 winegrape crop, a group of 30 industry leaders are also working to assemble the seminar program. "We still have a long way to go," says Bob Steinhauer (Program Development Committee Chairman). "As the process of locking in program details and confirming speakers progresses, topics and abbreviated program descriptions will be posted and routinely updated at www.unifiedsymposium.org. Registration information will be available in late October.

Built with the joint input of growers, vintners, and allied industry members, the Unified Wine & Grape Symposium provides wine and grape industry professionals with direct access to the latest information they need to remain competitive. The Unified Wine & Grape Symposium represents the collective experience, knowledge, and background of the entire industry. The Unified Symposium will host the industry's largest trade show of its kind in North America, with nearly 500 vendors displaying products and services.

For additional information visit www.unifiedsymposium.org. For exhibitor information call 530/753-3142.

EVENT ORGANIZERS –
Do you have Calendar Information?

Submit seminar topics and speaker information at least 75 days prior to *PWV* publication date!

—

October 15 for January/February 2008

—

December 15 for March/April 2008

—

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Varietal Review

continued from page 29

88°F) and are backed off at about 8°Brix. A drain-and-return is done on lots where reduction is noticed.

Free run is retained separately in tank from basket-pressed wine. Both go to barrel independently after 12 hours of settling.

Uninoculated MLF occurs in barrel and Stewart favors a delayed completion (that finishes in January or February) believing that it builds in layers of complexity. Wine remains on ML lees until blending in Summer.

Preferred coopers are François Frères, Remond, Rousseau, Mercurey, and Demptos with 38% new barrels. "Yet," says Stewart, "if I could use only one-year-old barrels, I would."

The goal is to bottle the wine unfiltered soon after blending and release in 8 to 9 months.

Last drop

Today, much has been spoken and written about terroir, which we prefer to reference as site personality or individual expression. The French argue, and rightly so, that it takes generations or longer for a vineyard to illustrate its terroir.

However, a discussion and tasting of vineyard-designated Pinot Noirs from Buena Vista Carneros, MacRostie, and Saintsbury, indicate that each, although from relatively young vineyards, presents an individual expression of Carneros Pinot Noir, achieved through vineyard management decisions and the winemaker's hand. ■

TASTING NOTES

2005 Buena Vista Carneros Estate Vineyard Series, Ramal Vineyard Pinot Noir $40

Color/Aroma: Ruby/violets, red fruits, dark cherry, dried fruits, cranberry, strawberry, barrel toast, and complex spice.

Flavors: Red fruits, cherry, strawberry, vanilla, cocoa, chocolate, and brown spices.

Balance/Finish: Full, medium-rich, clean, full mouthfeel, round, and pleasant.

2005 MacRostie Wildcat Mountain Vineyard, Sonoma Coast Pinot Noir $42

Color/Aroma: Youthful deep ruby/Black raspberry, blackberry, dark cherry, forest floor, and mushrooms.

Flavors: Ripe blackberries and raspberries with notes of brown spices, cocoa, and chocolate.

Balance/Finish: Full-bodied, rich, generous, elegant, and lengthy.

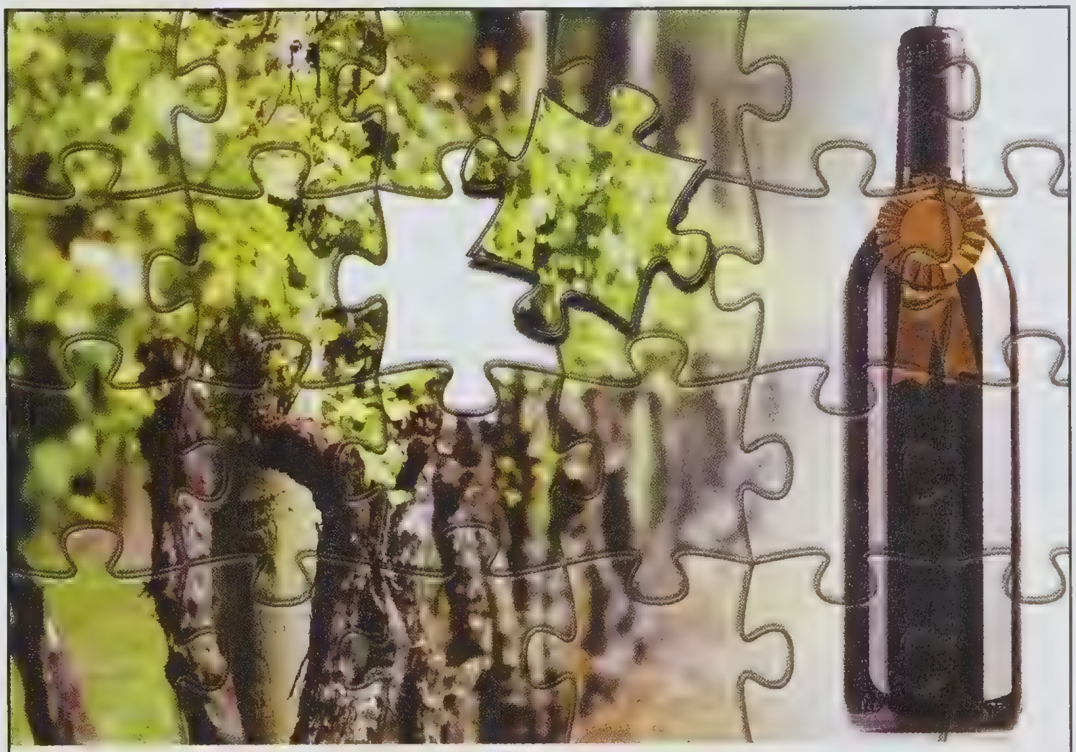
2005 Saintsbury Brown Ranch, Carneros Pinot Noir $60

Color/Aroma: Bright ruby/plum, dark cherry, black fruits, wood toast, forest floor, and cinnamon spice.

Flavors: Plum, cherry, pomegranate, juicy, and brown spices.

Balance/Finish: Big entry, excellent balance, good complexity, silky, juicy, and viscous.

PWV thanks Buena Vista Carneros for hosting the discussion/tasting.



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PERSONNEL POINT OF VIEW

by Jay Manriquez

When it comes to hiring, Look at the forest

Have you ever found and hired the "perfect" person to fill a position? This new tasting room manager not only has all the requirements you're looking for, but he/she also brings additional skills and experience as a bonus, and the person gets along great with everyone.

That "perfect" sales manager will not only meet your current needs but also future ones. The person is a perfect fit for the organization! "Perfect Fits" bring higher growth and profit for your winery or vineyard, and Perfect Fits tend to stick around longer, too. Wish you could identify and hire Perfect Fits more easily? There is a way.

Typically, when there is a position to fill, we look for someone who has the experience and skills to perform the job. Sometimes we find the right person, sometimes we don't, and sometimes we think we've hired the right person. But then after he's been on the job a short time, we find he wasn't the right fit after all.

What goes wrong during the hiring process for such "misfits" is best described by the expression, "Can't see the forest for the trees."

The trees represent the jobs or positions to be filled, while the forest represents your organization. Traditional hiring strategies match a candidate to the job — the job description and requirements. However, to find the perfect candidate, we need to look beyond the trees and see the forest — the winery or vineyard organization.

Hiring to the organization

Hiring to the organization means focusing on how well the individual fits your winery's culture or values and has the capacity to work well with other winery employees. But to know whether a potential vineyard manager is a Perfect Fit, you must have a strategic plan for your organization. You have to know the goals you want to accomplish in the short- and long-term, in order to understand whether the person you're planning to hire will contribute to accomplishing those goals.

If you know where your organization is heading, you can ask: " Does the winery's culture need to be maintained or do we need new blood to make changes? Do we want a vineyard manager who is innovative and brings new ideas that can be seriously considered?" or "Do we need a winemaker who has the skills to maintain our successful, established brand without feeling compelled to change it?" Ask yourself, "Will his personality promote the winery's values?" or "How would she fit in our vineyard management succession plan?"

Hiring to your organization means going beyond filling a job and looking at the ripple effect this job has throughout your organization's processes, systems, departments, and teams. The additional effort put into hiring to your winery or vineyard organization delivers positive results.

Benefits of hiring to the organization

Based on the research cited in *Human Resource Management Practices and Firm Performance in Small Businesses*, a research report on phase-4 of the Cornell University/Gevity Institute Study — Financial Impact; prepared by the Cornell Research Team, May 2006 — Dr. Christopher Collins, Jeff Erickesn, Doctoral Candidate, and Matthew Allen, Doctoral Candidate, in May 2006:

> "Employee selection strategies based on person-organization fit ... and retention strategies based on creating a family-like community and environment showed 7.5% higher sales growth, 6.1% higher profit growth, and 17.1% lower employee turnover than did companies ...[that hired] based on person-job fit."

That's right, hiring to the organization (versus hiring to the job) results in higher sales growth and profit, and these employees are going to stick around longer! Isn't that why we are in business?

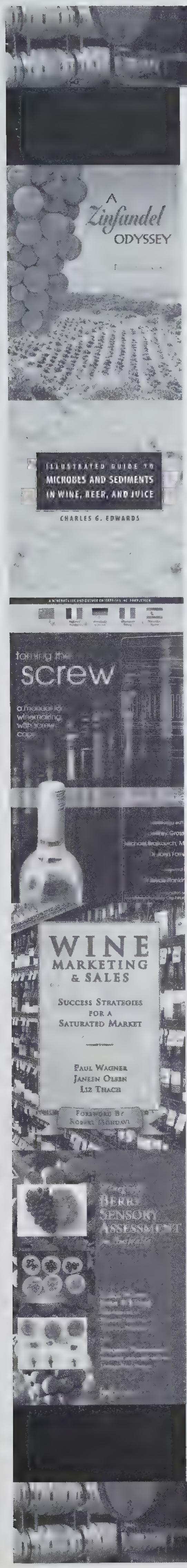
The results are even better when the hiring-to-the-organization strategy is combined with "employee management practices focusing on self-management, and employee motivation and retention strategies." The report indicates a whopping 22% higher sales growth, 23% higher profit growth, and 67% lower employee turnover. Such results are well worth the effort.

Believe it or not there is an additional benefit worth considering and that is the opportunity to become an employer of choice.

As an employer of choice, you've established a reputation for being a winery that people want to work for. As an employer of choice, your grapegrowing operation will attract more qualified candidates when you do have an open position to fill. You'll have a happier staff, and a happier staff translates to a higher-performing organization.

The key to finding Perfect Fit employees is in looking beyond the trees to the forest, so you can hire employees who perfectly fit your winery or vineyard organization. ■

Jay Manriquez is an Associate with The Personnel Perspective, a human resources consulting, training and recruiting firm in Santa Rosa, CA. Jay has 23 years of management experience with a focus in human resources, quality, and organizational development. You can contact him at 707/576-7653.



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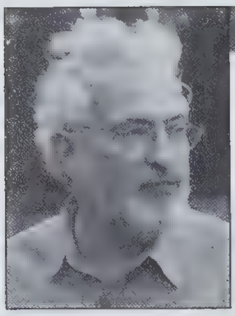
FROM SOIL TO WINE *by Daniel Roberts and Alfred Cass*



Influence of climate on rootstock selection

The July/August-2007 ***PWV*** column, "Influence of available water and salinity on rootstock selection," discussed my belief that total available water (TAW) in the rooting zone should be the primary criterion on which to base rootstock selection. Are there also climatic conditions that influence such decisions?

Rainfall

In Northern California (Sonoma, Napa, and Mendocino counties), rain mostly falls between late October and April with occasional storms in April and May. Total rainfall can exceed 70 inches in some costal areas, though 35 to 40 inches is more common. Rain fell in May and June 2005. For many growers, it occurred during bloom (Figure I), drastically reducing fruit set for Pinot Noir in some areas of the Russian River Valley and Sonoma Coast.

In one Sonoma Coast Vineyard, Pinot Noir on 420A showed excessive growth (internode length and shoot diameter) due to the May-June rainfall (Figure II), even though the TAW prior to planting was 3.5 inches. By bloom 2005, shoot growth exceeded three feet, which was weeks earlier than in 2004, a much drier spring (Figure I). After some draw-down of moisture earlier in the season, the rainfall refilled the soil profile, causing excessive growth.

Under the circumstances of May-June rainfall, perhaps Riparia Gloire would be a better rootstock choice. Riparia, however, is an early season rootstock and in the coastal areas; Pinot Noir can ripen in late October. Pinot Noir on Riparia may not express excessive vigor but may also lose leaves prior to ripening compared to 420A, which is a longer season rootstock. In this situation, there is an interaction between a vineyard's seasonal rainfall and temperature patterns.

In vineyards on the Sonoma Coast, I have chosen to plant later-ripening varieties, such as Chardonnay and Syrah, on Riparia and earlier varieties, such as Pinot Noir, on 420A. Of course, the clones used for these varieties can have a major influence on ripening, and this must be taken into account when planting in these very cool areas (Figure III).

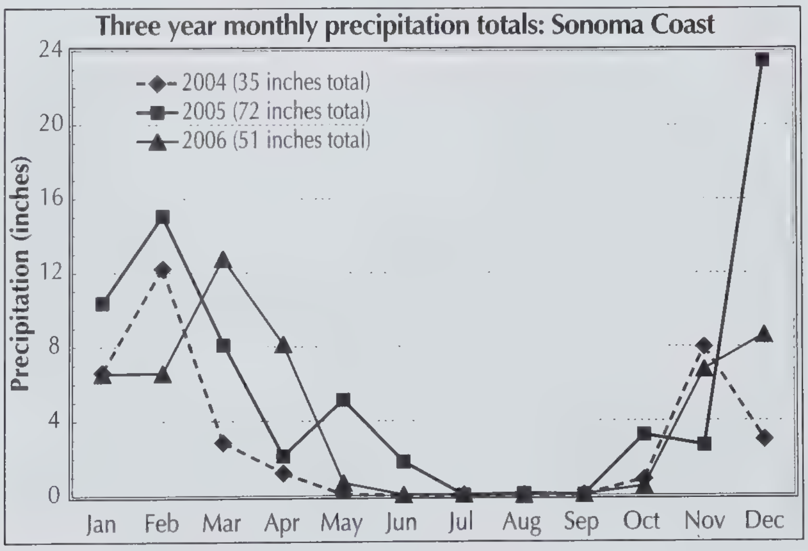


Figure I. Rainfall patterns from the CIMIS Station in a Sonoma Coast vineyard.

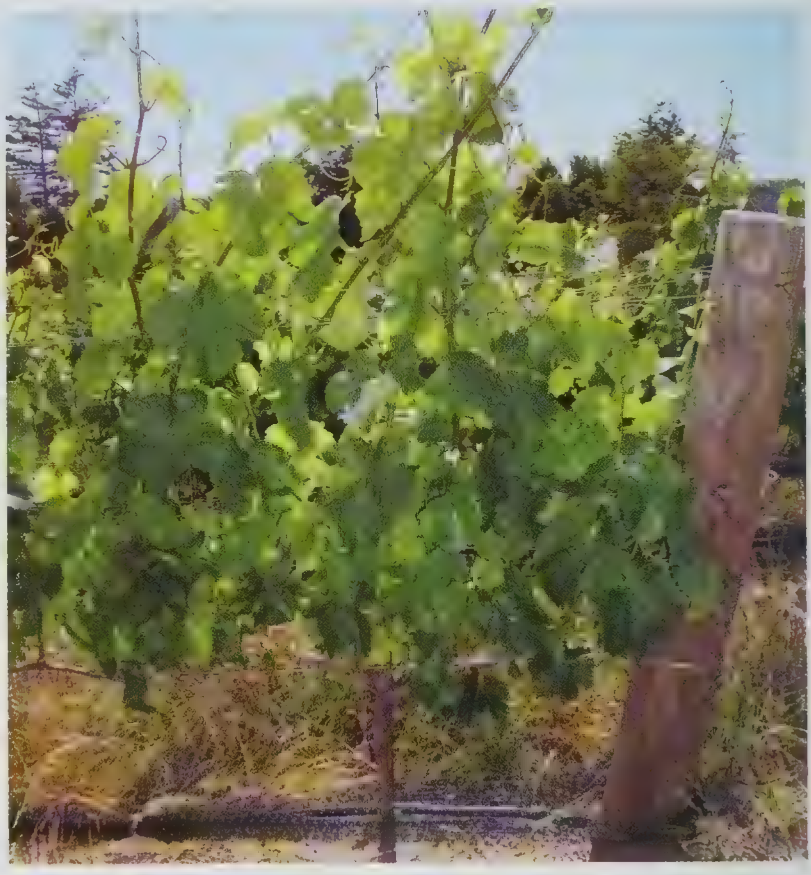


Figure II: Sonoma Coast Pinot Noir vineyard 2005. Note large internodes which were due to rain in May and June.

For areas in Southern California, such as in Santa Ynez Valley (Santa Barbara County), normal annual rainfall is 15 inches (Figure IV). But in some years like 2007, the seasonal rainfall was only five inches. Under conditions where such low rainfall is the norm, a shallow-rooted rootstock, such as Riparia Gloire, may not be a good choice because the vines could be under constant or frequent water stress.

In some areas of the United States where vines are planted, summer rainfall is common and expected. My firm was consulted

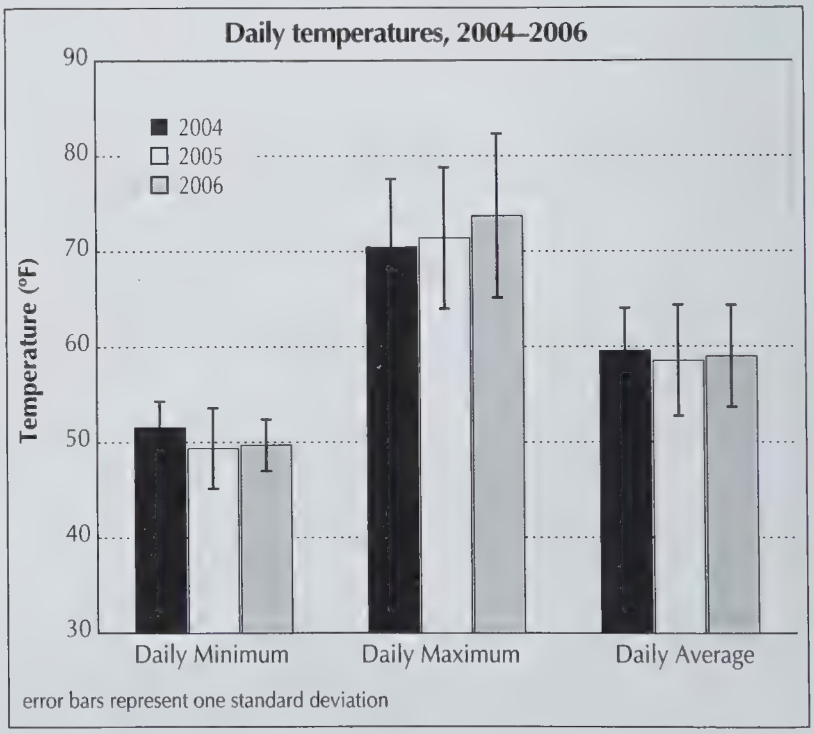


Figure III. Daily temperatures for a Sonoma Coast vineyard.

about one vineyard with rainfall that equals Oakville, CA, (Figure V) but a significant part of that rainfall occurs during the growing season. At the RDV Vineyard in the foothills of the Blue Ridge Mountains (Virginia), 93% of the 16.25 acres was planted on Riparia Gloire, even though most of the TAWs in the area planted seemed to call for a more vigorous rootstock, such as 3309C. Riaparia Gloire was used because the summer rain would maintain the soils at field capacity and using 3309C would produce excessive vigor.

Temperature

Planting short-season rootstocks (Riparia Gloire and 101-14) in a cool climate can be an issue. Leaf loss during the ripening period may require irrigation, which might be harmful to fruit quality, but also Riparia Gloire might allow earlier ripening of varieties like Syrah in cool areas.

A vineyard on the Sonoma Coast at 1,200 ft elevation, 3.5 miles from the ocean has a change in diurnal temperature of 18°F from veraison to harvest (Figure VI) with approximately 2500 degree days by the end of October. Ripening Syrah in this location is a challenge, and a shallow-rooted rootstock may be the advantage required under these circumstances.

The rootstock 101-14 would be too vigorous, especially with the frequency of spring rains.

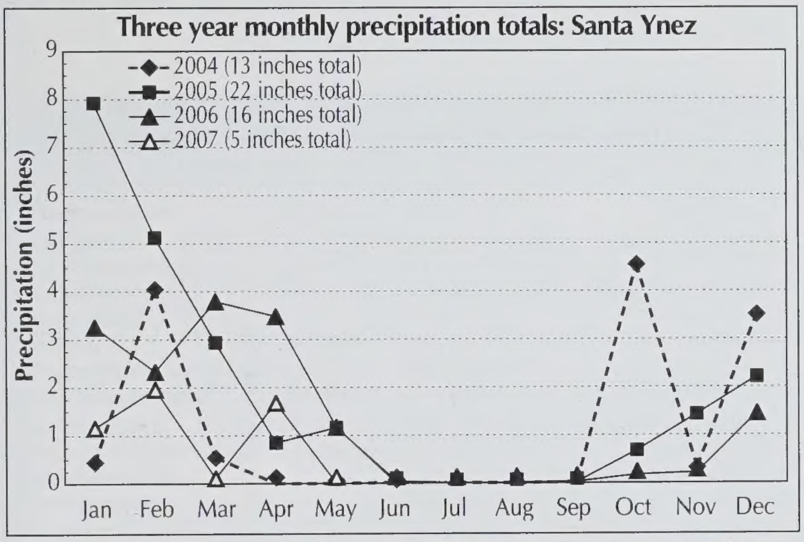


Figure IV. Rainfall patterns from the CIMIS Station in a vineyard (Santa Ynez, CA).

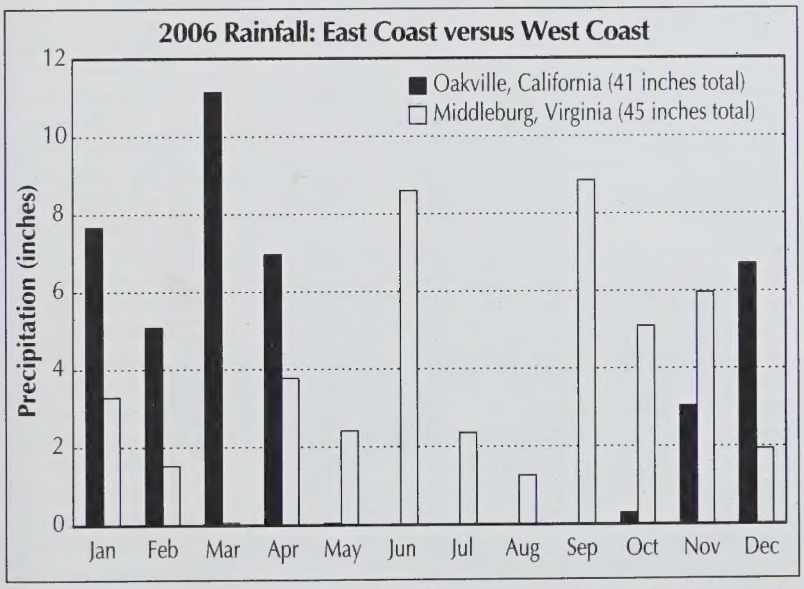


Figure V. Comparison of 2006 rainfall patterns in the RDV Vineyard (Virginia) to the CIMIS Station in Oakville, CA.

Some areas within the U.S. where wine grapes are grown experience winter temperatures cold enough to damage vines (Figure VII). One of these areas is in eastern Washington state where phylloxera is not currently an issue. Under such cold conditions, own-rooted vines are probably the best choice. Own-rooted vines may limit your options due to excessive growth, soil chemical issues, and possibly nematodes, but if a rootstock is used and the temperature kills the scion back to the graft union, then getting back into production takes longer. If the rootstock is killed and the vineyard requires replanting, this could be a financial disaster.

Cold climate areas where phylloxera has spread create difficult situations. For example, some areas of the eastern U.S. experience both very cold winters and phylloxera, and rootstock choices then become problematic.

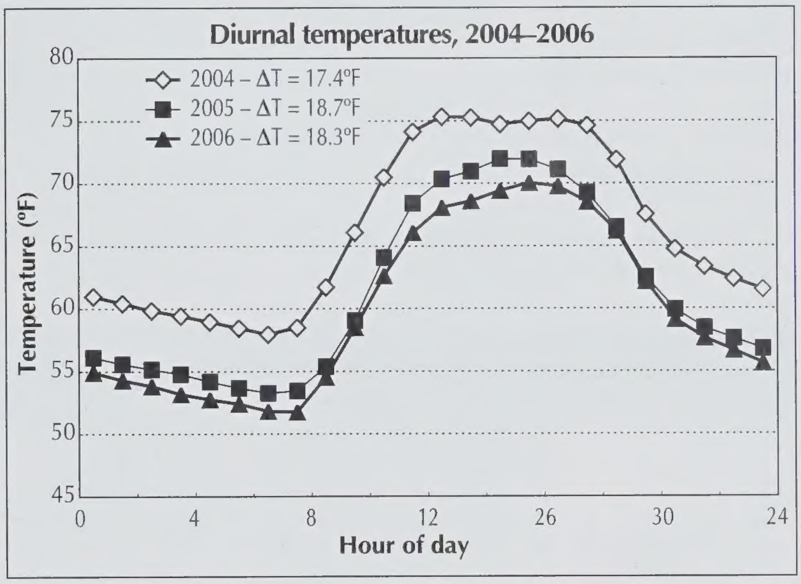


Figure VI. Diurnal temperature change from veraison to harvest for a Sonoma Coast Syrah vineyard.

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Conclusions

In a dry climate such as Santa Ynez Valley (2006/2007 had 5 inches of rain), Riparia Gloire would be under constant water stress and therefore not a good choice in this region.

In a climate where rain occurs throughout the growing season such as Virginia, regardless of TAW, lower vigor rootstocks such as Riparia Gloire and 420A may be best choices.

In areas on the North Coast of California where late spring rains are an annual occurrence, the use of 420A (as determined by TAW), may produce long internodes and excessive growth. Riparia Gloire may be a better choice.

Riparia Gloire is a short season rootstock. Therefore using it for Pinot Noir in a cool climate vineyard (west of Freestone on the North Coast) may result in significant leaf-loss prior to ripening.

In parts of the U.S. where winter kill is a factor (eastern Washington), the current lack of a phylloxera risk allows the use of own-rooted vines. The use of own-rooted vines, however, can put one at risk for nematodes and certain soil chemical problems. ■

References

Roberts, D, and A. Cass, *PWV*, July-August 2007

Some figures for this article were supplied by Mark Greenspan, Advanced Viticulture LLC.

Dr. Daniel Roberts, Integrated Winegrowing, LLC, has been a viticultural consultant since 1997. His experience includes eight years at Kendall-Jackson Wine Estates (California), and ten years at Sterling Vineyards (Napa County). Contact Dr. Roberts by phone: 707/824-6946 or e-mail: daniel@intregratedwinegrowing.com.

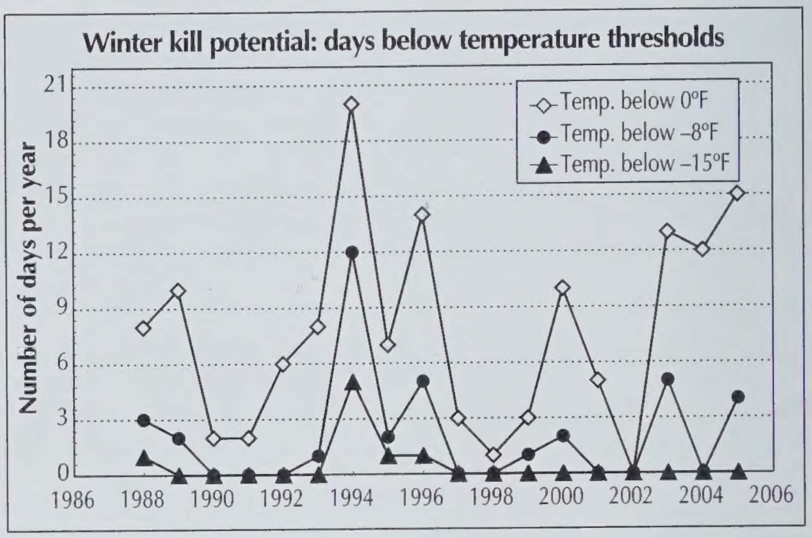

Figure VII. Winter kill potential illustrated as the number of days during the winter where temperatures fall below three thresholds: Temperatures below 0°F may kill individual buds or whole, young vines; below –8°F may kill some mature vines; below –15°F is likely to kill mature vines.

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Sunlight Electric	3	866-Get-Solar		sunlightelectric.com
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Tonnellerie Boutes	10	510-799-1518	510-799-1557	boutesusa@aol.com
Tonnellerie Saury USA	23	707-944-1330	707-944-1370	info@sauryusa.com
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Winegrowing Consortium	85	888-897-3030		winegrowingconsortium.com
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